The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1992

Technical Paper No. 229
Part 1

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Frontispiece. Sea lion helmet, Sitka (Tlingit). Original collected circa 1794. Reproduction by Steve Brown in 1981. Photo courtesy Sheldon Jackson Museum, Sitka, and the Alaska State Museum, Juneau (Catalog No. **I.A. 130b).** The sea lion is a crest of several Tlingit clans in Southeast Alaska. Its emblem is used on hats and other regalia.

ABSTRACT

This report describes the subsistence takes of harbor seal (*Phoca vitulina*) and Steller sea lion *(Eumetopias jubatus)* by Alaska Natives in 1992, including size, seasons, geographic distribution, and age and sex of the harvest. Information is summarized at the state, region, and community levels. The research was conducted by the Division of Subsistence, Alaska Department of Fish and Game under contract with the National Marine Fisheries Service. information derives from systematic interviews with hunters and users of marine mammals in 2,105 households in 65 coastal communities within the geographic ranges of the two species. Local research assistants trained as part of the project assisted in the collection of information. The project received generous support from leaders of a number of Native governments and regional and statewide associations.

During 1992, the estimated subsistence take of harbor seal by Alaska Natives was 2,867 seals, with a 95 percent confidence range of between 2,317 to 3,677 seals. Of the take, 11.9 percent were struck and lost (342 seals) and 88.1 percent (2,525 seals) were harvested. In addition, there were 437 seals taken in North Bristol Bay which were classified as spotted seal (*Phoca largha*) based on ecological evidence, and 34 fresh water harbor seals taken by two communities from Lake Iliamna which were excluded from the statewide estimate. Harbor seals were taken in 60 of 65 surveyed communities. The largest takes (58.3 percent of the take) were by Tlingit and Haida hunters in the Southeast region. Harbor seals were taken in all months of 1992, with seasonal peaks during October-December and a low during June. Hunters reported taking male harbor seals over females about 2 to 1, and reported taking primarily adult harbor seals.

During 1992, the estimated subsistence take of sea lions by Alaska Natives was 548 sea lions, with a 95 percent confidence range of between 452 to 711 sea

lions. Of the take, 32.7 percent (179 sea lions) were struck and lost and 67.3 percent (369 sea lions) were harvested. Sea lions were taken in 23 of 65 surveyed communities. The largest takes (78.9 percent of the take) were by Aleut hunters in the Aleutian-Pribilof region. Sea lions were taken in all months of 1992, with seasonal peaks during September and October and lows during June-August. Hunters reported taking males over females about 3 to 1, and reported taking twice as many juvenile sea lions as adults or pups.

Comparisons of the annual takes of harbor seals and sea lions in 1992 with other years can be done for only a handful of communities. These comparisons suggest variability in subsistence takes across years and communities due to a number of ecological, economic, and cultural factors. Several general historic factors suggest that the statewide subsistence takes of harbor seals and sea lions were lower in 1992 compared with subsistence takes in the recent past, including beliefs by some hunters that sea lion hunting was closed in 1992, the continuing effects of the 1989 *Exxon Valdez* oil spill in Prince William Sound, and general declining trends in sea lion and harbor seal populations in portions of their ranges. The subsistence take of harbor seals in 1992 (2,867 seals) was found to be significantly lower than historic takes of harbor seals during the years of the territorial and state bounty program, which conservatively numbered at least 10,000 harbor seals annually from 1949 to 1966.

ACKNOWLEDGEMENTS

This project would not have been possible without the generous local support in every community where we conducted the survey. We wish to thank each tribal council, city council, and regional Native organization who facilitated our work. Robert L. Polasky, Carl M. Hild, and Lisa Rotterman of RurAL CAP assisted us in this effort and merit special mention, along with members of the Indigenous Peoples Council on Marine Mammals who reviewed portions of the research design. Heartfelt thanks are owed to the many elders and local marine mammal experts who allowed us to interview them at length about their lifelong us8 and observations of sea lions and harbor seals. In addition, we are deeply indebted to the many hundreds of hunters who volunteered to report their subsistence harvests to our staff and to locally hired research assistants.

The sixty-three local research assistants who helped us conduct interviews deserve to be recognized individually for their high level of interest and work. We look forward to working with many again in the near future as the project moves into its second year:

Marvin Agnot in Akhiok
Jacob Stepetin in Akutan
Joe Coolidge in Aleknagik
Ray Golodoff in Atka
Diane Selanoff in Chenega Bay
Polly Aleck in Chignik Bay
Marcy Sam in Chignik Lagoon
Mitchell Lind in Chignik Lake
Henry Wassily in Clark's Point
Jerry O'Brien in Cordova
Fred Hamilton in Craig
Ida Roehl in Dillingham
Joy Abalama in Egegik
Gilda Shellikof in False Pass
Donald Hotch, Sr. in Haines
Marilyn Wilson in Haines
Wanda Culp in Hoonah
Frank Alby in Hydaburg
Artemie Kalmakoff Jr. in Ivanof Bay
Randall Johnson in Juneau
Anna Katzeek in Juneau
Florence Sheakley in Juneau
Steven Rose in Kake
Emil Sugak in Karluk
Gerald Hope in Ketchikan
Simeon Kuzakin in King Cove
Ruthann Kvasnikoff in King Salmon
Lavina Ellison in Klawock
David Pestrikoff in Kodiak City
Sheila Theriault in Larsen Bay
Howard J. Nelson in Levelock
Homer Bartman in Manokotak
Joanne Itumulria in Manokotak
Mindy Beal in Metlakatla
Norm Anderson in Naknek
Nick Tanape in Nanwalek

Sharlene Nelson in Nelson Lagoon
Agrafina Kerr in Nikolski
George Inga, Sr. in Old Harbor
Robert Katelnikoff in Ouzinkie
James E. Phillips in Pelican
Harry Kosbruk in Perryville
Mike Lopez in Petersburg
Jimmy Shanigan in Pilot Point
Mary Malchoff, Port Graham
Anna Metcalf, Port Graham
Bobby Christensen in Port Heiden
Pete Squartsoff in Port Lions
Christine Mack in Sand Point
Albert Jackson in Saxman
Lillian Elvsaas in Seldovia
Danielle Deer in Seward
Robbie Littlefield in Sitka
Ted Angasan in South Naknek
Dimitri "Dino" Zacharof in St. Paul
Burt Merculief in St. George
Henry Bavilla in Togiak
Anton8 Togiak in Togiak
Vince Tutiakoff in Unalaska
Agnes Hansen in Valdez
Brad Osborne in Valdez
Sandra Churchill in Wrangell
Walter A. Johnson Sr. in Yakutat

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INTRODUCTION

This report describes the subsistence take of harbor seal *(Phoca vitulina)* and Steller sea lion *(Eumetopias jubatus)* by Alaska Natives in 1992. It is the first report of a two-year study of harbor seal and sea lion in Alaska.' The research was conducted by the Division of Subsistence of the Alaska Department of Fish and Game (ADF&G) under contract with the National Marine Fisheries Service (NMFS). The study was conducted in cooperation with the Rural Alaska Community Action Program (RurAL CAP), which assisted in the review of the project design and accompanied researchers to select communities.

The report provides information on the subsistence takes of harbor seal and sea lion during 1992, the first study year, including size, seasons, geographic distributions, and age and sex of harvested animals. Information derives from systematic interviews with marine mammal hunters in 65 communities (Fig. 1). Subsequent reports during the second year will provide estimates of the subsistence take for a second year, as well as information on other aspects of the use pattern, including methods of harvest, traditional rules regulating the Alaska Native take in particular areas, and ecological knowledge about conditions of harbor seal and sea lion populations, based on reports of expert marine mammal hunters.

The geographic area covered by this report was defined as the Alaska coastal waters south of Cape Newenham, and including the Pribilof Islands. The general distributions of sea lion and harbor seal in Alaska are depicted in Figs. 2 and 3 (from Burns, Frost, and Lowry 1985). Harbor seals range throughout most of the Pacific coastal waters of Alaska, including the southeast archipelago, the Gulf of Alaska, the Alaska Peninsula, and the Aleutian Island chain. Most harbor seals are found south of Bristol Bay. Spotted seal *(Phoca largha)* appear to displace harbor

seal north of this point, although there is a question of the degree Of Seasonal overlap of the species in southwest Alaska. Sea lions also range the Pacific coastal waters of Alaska. Like harbor seal, sea lion are most abundant in Alaskan waters south of the Pribilof Islands and Bristol Bay, although lower numbers occur seasonally in northern Bering Strait.

The use of marine mammals by Alaska Natives for food and raw materials has a long tradition in Alaska, since before historic contact through to the present. Harbor seal have been used for food and raw materials by most of the Alaska Native groups of the Pacific coastal regions and southern Bering Sea. The Alaska Native groups using harbor seal include the Aleut of the Aleutian Islands, the Alutiiq and Eyak of the Pacific Gulf coast, the Dena'ina of Cook Inlet, the Tlingit, Haida, and Tsimshian of the southeast archipelago, and the Yup'ik of southwest Alaska.

Traditionally, sea lions were used for food and raw materials by most Native peoples in their geographic range; however, during this recent century sea lions have been used by a more limited range of Alaska Native groups (Haynes and Mishler 1991). The Aleut of the Aleutian and Pribilof Islands and the Alutiiq of certain communities of Kodiak Island and the North Pacific Rim regions currently are the primary users of sea lion. Sea lion are used more occasionally by Tlingit, Haida, Tsimshian, and Yup'ik groups.

The report is organized in several sections. The Methodology section describes the methods used to collect information. Two sections (The Subsistence Take of Harbor Seal in 1992 and The Subsistence Take of Sea Lion in 1992) Presents information on the statewide takes of harbor seal and sea lions in 1992, Summarized by Community and region (see Fig. 1). The section called Species Identification in Bristol Bay discusses the categorization of seal kills in the Bristol Bay region. In the Discussion section are interpretations of the 1 992 survey year,

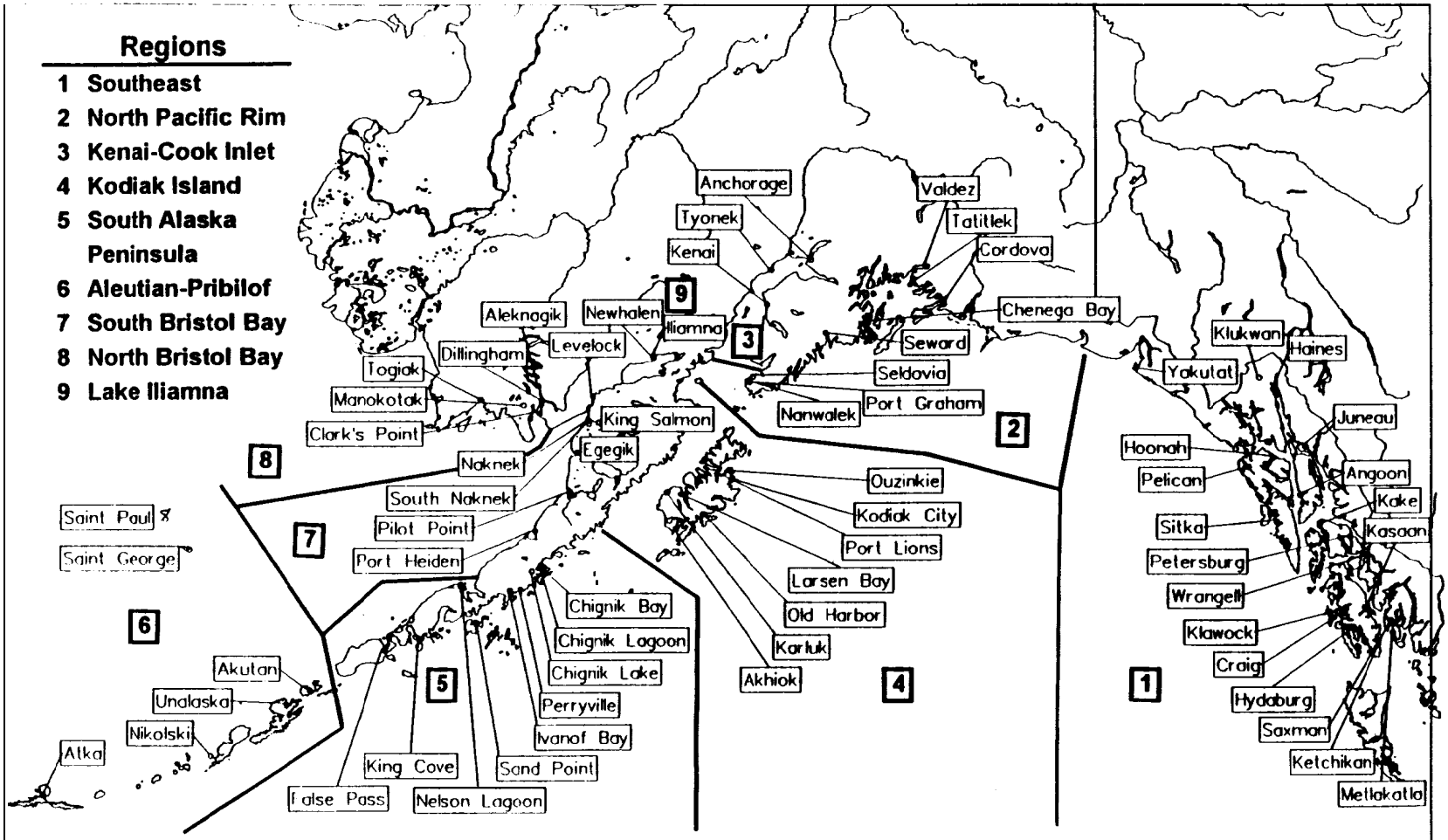


Fig. 1. Map of surveyed communities and regions

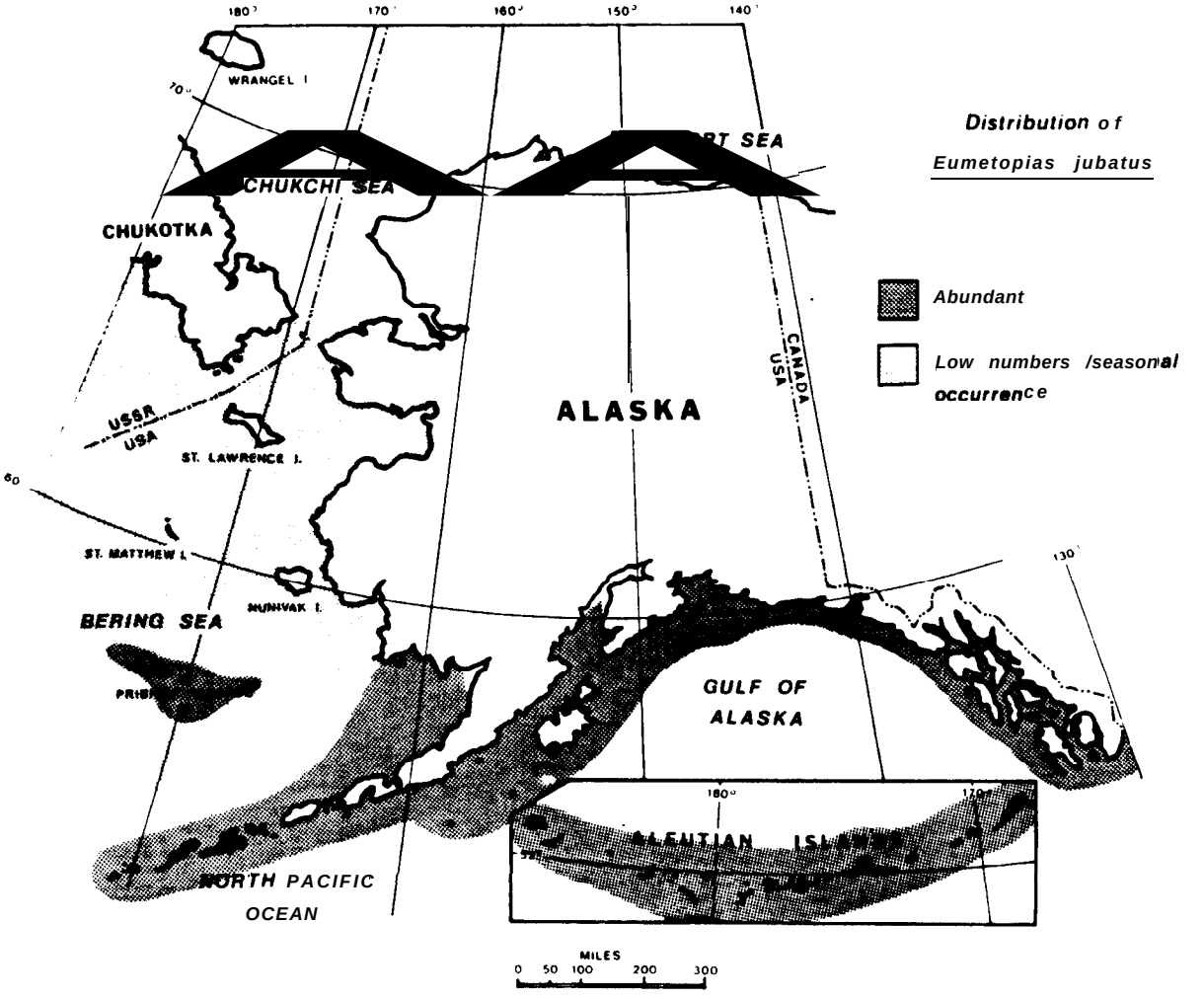


Fig. 2. General distribution of sea lion in Alaska. (Source: Burns, Frost, and Lowry 1985)

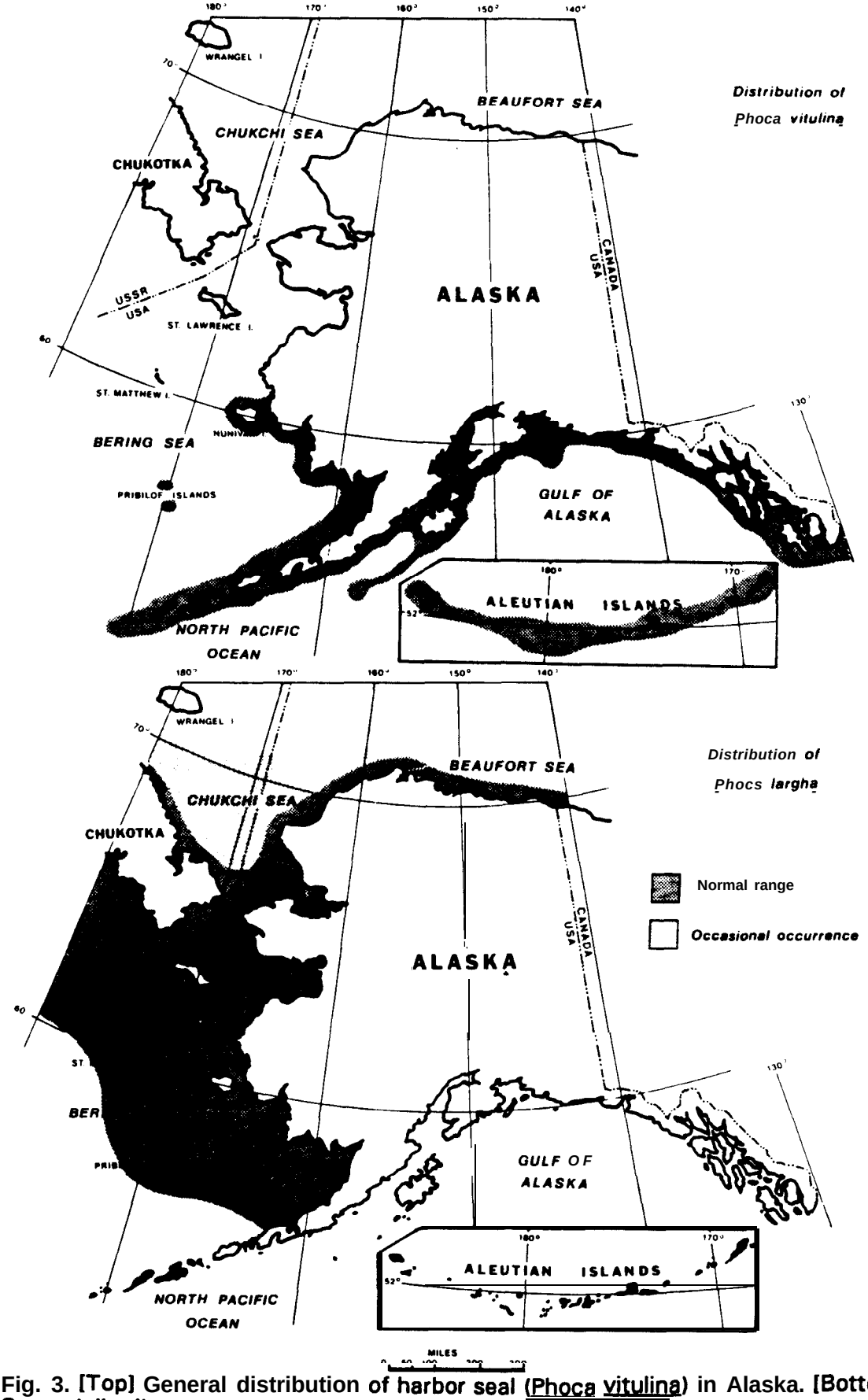


Fig. 3. [Top] General distribution of harbor seal (Phoca vitulina) in Alaska. [Bottom] General distribution of spotted seal (Phoca largha) in Alaska. (Source: Burns, Frost, and Lowry 1985)

including comparisons with other years for select communities. The section also describes the network of local researchers who will be involved in the second year of the research. Appendix A contains a copy of the survey instrument used in household interviews with marine mammal hunters. Appendix B contains regional summaries of the subsistence takes of harbor seal and seal lion. The Addendum to Appendix B provides a history of hair seal takes under the territorial and state bounty and predator control programs. Appendix C contains detailed materials on the subsistence take of harbor seal and sea lion by individual community.

Throughout the report, there is a consistent use of the terms, "harvest", "struck and lost", and "take". "Harvest" refers to animals killed and retrieved by hunters. "Struck and lost" refers to animals which were shot by the hunter but not retrieved and presumed to have died. "Take" is the sum of "harvest" and "struck and lost", and refers to the total number of animals killed by a subsistence hunter. The figures and tables of the report consistently follow these conventions.

METHODOLOGY

Information on the take of harbor seal and sea lion was collected through interviews with persons in 2,105 Alaska Native households in 65 coastal communities during early 1993 (Fig. 1). Respondents were asked to recall information about their household's last year's use of marine mammals. The survey instrument administered in household interviews was developed in consultation with RurAL CAP and the Indigenous People's Council for Marine Mammals (see Appendix A). Household hunters were asked to recall the number of sea lions and harbor seals taken during each month over the past year. The survey contained questions that pertained to harvest numbers, struck and lost animals, age of animals, and sex of animals. The survey also asked whether the household used, harvested, received, or gave away sea lion or harbor seal during the last year. Interviews were conducted by researchers from the Division of Subsistence and local research assistants hired and trained as part of the project. Interviews took place in early 1993 (January through March in most communities). In addition, semi-structured key respondent interviews were conducted with select marine mammal experts in each community, to provide contextual information to assist in the interpretation of the year's harvest information. The following section describes aspects of the study design.

Contacts with Native Governments, Other Associations, and Marine Mammal Hunters

A number of Native governments, Native leaders, and associations with interests in harbor seal and sea lion management were contacted during the course of the project. At onset, three statewide organizations were informed of the project

-- the Alaska Federation of Natives, RurAL CAP, and the Indigenous People's Council for Marine Mammals. Regional associations also were contacted during project development, including:

1. Aleutians East Borough;
2. Aleutian-Pribilof Islands Association;
3. Bristol Bay Native Association;
4. Central Council of Tlingit and Haida Indian Tribes of Alaska;
5. Cook Inlet Region, Inc.;
6. Kodiak Area Native Association; and
7. The North Pacific Rim (Chugachmiut).

A variety of helpful suggestions were received from the statewide and regional organizations concerning procedures, contact persons in communities, and scheduling of the project. As stated above, the survey instrument and key respondent question list were reviewed by members of RurAL CAP and the Indigenous People's Council for Marine Mammals.

A standard procedure of Division of Subsistence research in communities with Alaska Native governments is to solicit approval of subsistence projects by local Native governments, or by leaders of local government entities (see Fall 1990). A project will not be conducted in a community if the project is not supported by local Native governments or their leaders. Contacts were made with representatives of all the entities listed in Table 1. The project received local support in 65 communities. In Twin Hills, the Traditional Tribal Council was unable to meet in quorum to act on the request to conduct the study. In this case, the Division Of Subsistence chose not to proceed with the study in Twin Hills, even though the request was neither formally approved nor denied. Many local governments were extremely helpful with the project, especially by identifying Native households, potential local research assistants, and marine mammal

TABLE 1.
ORGANIZATIONS CONTACTED DURING THE PROJECT

Community	Government/Organization Contacted
Akhiok	Akhiok Tribal Council City of Akhiok
Akutan	Akutan Traditional Village Council City of Akutan Akutan Corporation
Aleknagik	Aleknagik Tribal Council
Anchorage	Cook Inlet Tribal Council Alaska Federation of Natives
Angoon	City of Angoon
Atka	Atka IRA Council City of Atka
Chenega Bay	Chenega Bay IRA Council
Chignik Bay	Chignik Bay Traditional Village Council
Chignik Lagoon	Chignik Lagoon Traditional Village Council
Chignik Lake	Chignik Lake Traditional Village Council
Clark's Point	Clark's Point Traditional Council
Cordova	Traditional Village of Eyak
Craig	Shaan-Seet, Inc. City of Craig
Dillingham	Dillingham Traditional Council
Egegik	Egegik Traditional Council
False Pass	False Pass Tribal Council City of False Pass
Haines	Chilkat Indian Association
Hoonah	Hoonah Traditional Council
Hydaburg	Haida Corporation City of Hydaburg
Iliamna	Iliamna Village Council
Ivanof Bay	Ivanof Bay Traditional Village Council
Juneau	Tlingit and Haida Central Council Sealaska Aukr Tribe Council Alaska Native Brotherhood/Sisterhood
Kake	Organized Village of Kake City of Kake
Karluk	Karluk IRA Council
Kenai	Kenaitze Indian Tribe IRA Cook Inlet Region, Inc.
Ketchikan	Ketchikan IRA Council Ketchikan Indian Corporation
King Cove	Agdaagux Tribe of King Cove Belofsky Village Council City of King Cove
King Salmon	King Salmon Traditional Council
Klawock	Klawock Cooperative Association Klawock Heenya Coporation
Klukwan	Chilkat Indian Village
Kodiak City	Kodiak Tribal Council Kodiak Area Native Association
Larsen Bay	Larsen Bay Tribal Council City of Larsen Bay
Levelock	Levelock Traditional Council

Community	Government/Organization Contacted
Manokotak	Manokotak Traditional Council
Metlakatla	Council Annette Islands Reserve Metlakatla Indian Community
Naknek	Naknek Tradition81 Council
Nanwalek	Nanwalek Traditional Council English Bay Corporation
Nelson Lagoon	Nelson Lagoon Village Council
Newhalen	Newhalen Traditional Councrl
Nikokrki	Nikolski IRA Council Chaluka Corporation
Old Harbor	Old Harbor Tribrl Council City of Old Harbor
Ouzinkie	Ouzinkie Native Corporation Ouzinkie Tribal Council City of Ouzinkie
Pelican	Tlingit and Haida Indians of Pelican Community Council City of Pelican
Perryville	Perryville Tradition81 Village Council
Petersburg	Petersburg Indian Association
Pilot Point	Pilot Point Traditional Council
Port Graham	Port Graham Village Council Port Graham Corpontion
Port Heiden	Port Heiden Traditional Council
Port Lions	Port Lions Tribrl Council City of Port Lions
Saint George	Saint George Traditional IRA Council Saint George Tanaq Corpontion City of Saint George
Saint Paul	Tribal Government of Saint Paul City of Saint Paul
Sand Point	Unga Tribrl Council Qagan Tayagugin Tribe of Sand Point City of Sand Point
Saxman	Saxman IRA Council City of Saxman
Seldovia	Seldovia Native Association
Seward	Qutekcak Native Tribe
Sitka	Alaska Native Brotherhood Sitka Tribal Council
South Naknek	South Naknek Traditional Council
Tatitlek	Tatitlek IRA Council
Togiak	Togiak Tradition81 Council
Tyonek	Native Village of Tyonrk
Unalaska	Quswelangin Tribal Council
Valdez	Valdez Native Association
Wrangell	Wrangell Cooperative Association
Yakutat	Yakutat Alaska Native Brotherhood/Alaska Native Sisterhood Yakutat Native Association Yak-Tat Kwaan

experts in the community to contact. The support of local governments is gratefully acknowledged in the sources of the tables and figures in Appendix C.

Ultimately, the decision to participate in the project resided in each marine mammal hunter. Permission to administer the household harvest survey was asked of each individual respondent. This was done face-to-face at the person's home or during an initial phone contact. At this time, the purpose of the project was described. Marine mammal hunters and other respondents were informed that participation in interviews was completely voluntary. The person was told that the identity of all respondents would be kept confidential in reports presenting the information. If a person declined to participate in the study, the person was thanked for his or her time and a survey was not conducted. Persons who were interviewed as part of the harvest survey were not paid. However, marine mammal experts who participated in lengthy, key respondent interviews were paid for their time by the hour.

As indicated by the above procedures, the information in the report is based almost entirely on the knowledge and observations of indigenous peoples who use marine mammals, voluntarily given to researchers from outside the community. Most marine mammal hunters generously offered their assistance to the study, despite expressed concerns that the information might be misused by government agencies. There appeared to be three common reasons for hunters to choose to participate in the project: a desire to teach outside researchers about sea lions and harbor seals in their communities; a concern for the health of the sea lion and harbor seal populations; and a desire for important subsistence practices to be recognized and protected in law and regulation.

Community Selection and Regional Groupings

All coastal Alaska communities with significant Alaska Native populations in the usual geographic ranges of harbor seal or sea lion were included in the study, listed in Table 2 by region. The 65 selected communities had a combined Alaska Native population of about 37,678 people according to the 1990 federal census. Excluding Anchorage (with about 14,569 Alaska Natives), the other 64 communities contained 23,109 Alaska Natives.

Non-Native households and communities without significant Alaska Native populations were not surveyed. Native households were defined as households with one or more Native members. With a few exceptions (non-Natives married into Native households and non-Natives during the bounty period), the subsistence hunting of marine mammals by Euro-Americans has not been common in Alaska, as they are not traditional foods. Since 1972, marine mammal hunting by persons other than Alaska Natives has been prohibited by the federal Marine Mammal Protection Act. The exclusion of predominantly non-Native communities and non-Native households may lead to a slight underestimate of the total Alaska subsistence take of harbor seals and sea lions. Unsurveyed coastal communities in the study area included Adak, Beecher Pass, Coffman Cove, Cold Bay, Edna Bay, Elfin Cove, Gustavus, Hollis, Hyder, Meyers Chuck, Point Baker, Port Alexander, Port Protection, Skagway, Tenakee Springs, Thorne Bay, Whale Pass, and Whittier.

Certain culturally-heterogeneous communities were surveyed, such as Juneau, Ketchikan, Kodiak City, Pelican, Petersburg, Seldovia, Seward, Sitka, Unalaska, Valdez and Wrangell. The sprawling metropolitan areas of Anchorage and the Kenai Peninsula were included the first year, though finding Alaska Native marine mammal hunters in these areas proved to be technically difficult because of the dispersed social networks of Native families.

TABLE 2
SAMPLING METHODOLOGY BY COMMUNITY,
HARBOR SEAL AND SEA UON SURVEYS, 1992

Region and Community	1990 Native Population	Type of Design	Identified Household Universe	Surveyed Households	Percent Households Surveyed
1. SOUTHEAST					
1 Angoon	626	Mixed	26	24	92.3%
2 Craig	268	Chain Referral	29	26	66.2%
3 Haines	279	Chain Referral	26	23	68.6%
4 Hoonah	534	Mixed	64	60	76.1%
5 Hydaburg	342	Chain Referral	16	14	63.3%
6 Juneau	3462	Chain Referral	110	87	76.1%
7 Kake	514	Chain Referral	68	61	69.7%
8 Kasaan	29	Chain Referral	0	1	100.0%
9 Ketchikan	1614	Chain Referral	17	13	76.6%
10 Klawock	392	Chain Referral	32	23	71.9%
11 Klukwan	112	Chain Referral	6	5	100.0%
12 Metlakatla	1209	Chain Referral	4	3	76.0%
13 Pelican	66	Chain Referral	16	14	77.6%
14 Petersburg	3 3 4	Chain Referral	26	19	76.0%
16 Saxman	2 8 4	Chain Referral	21	17	81.0%
16 Sitka	1797	Chain Referral	68	54	76.4%
17 Wrangell	607	Chain Referral	6	3	60.0%
16 Yakutat	294	Chain Referral	62	39	75.0%
Region Total	12581		588	475	81.1%
2. NORTH PACIFIC RIM					
1 Chenega Bay	65	Census	23	20	87.0%
2 Cordova	272	Two Strata	161	42	23.2%
3 Nanwalek	144	Census	38	30	78.6%
4 Port Graham	160	Census	66	48	66.7%
5 Seldovia	46	Two Strata	64	36	66.7%
6 Seward	410	Two Strata	167	39	24.8%
7 Tatitlek	103	Census	26	25	96.2%
6 Valdez	239	Simple Random	120	31	26.8%
Region Total	1431		655	271	41.4%
3. UPPER KENAI-COOK INLET					
1 Anchorage	14569	Chain Referral	19	10	52.6%
2 Kenai	1904	Chain Referral	6	6	75.0%
3 Tyonek	142	Census	63	47	88.7%
Region Total	16615		80	63	78.8%
4. KODIAK ISLAND					
1 Akhiok	72	Census	22	22	100.0%
2 Karluk	66	Census	18	12	66.7%
3 Kodiak City	611	Two Strata	310	64	20.6%
4 Larsen Bay	124	Census	36	36	62.1%
5 Old Harbor	262	Two Strata	62	63	76.8%
6 Ouzinkie	170	Census	54	47	87.6%
7 Port Lions	150	Two Strata	59	64	01.5%
Region Total	1652		583	297	50.9%

TABLE 2 CONTINUED
SAMPUNG METHODOLOGY BY COMMUNITY,
HARBOR SEAL AND SEA UON SURVEYS, 1992

Region and Community	1990 Native Population	Type of Design	Identified Household Universe	Surveyed Households	Percent Households Surveyed
5. SOUTH ALASKA PENINSULA					
1 Chignik Bay	85	Census	31	26	83.9%
2 Chignik Lagoon	30	Census	19	19	100.0%
3 Chignik Lake	122	Census	31	30	96.8%
4 False Pass	62	Census	16	17	94.4%
5 Ivanof Bay	33	Census	6	6	100.0%
6 King Cove	177	Two Strata	116	61	51.7%
7 Nelson Lagoon	67	Census	27	26	96.3%
8 Perryville	102	Census	30	27	90.0%
9 Sand Point	433	Two Strata	167	91	58.0%
Region Total	1101		439	305	69.5%
6. ALEUTIAN-PRIBILOF					
1 Akutan	60	Census	30	26	93.3%
2 Atka	91	Census	22	20	90.9%
3 Nikolski	29	Census	14	12	86.7%
4 Saint George	131	Census	47	41	87.2%
5 Saint Paul	604	Two Strata	131	64	64.1%
6 Unalaska	259	Two Strata	77	54	70.1%
Region Total	1094		321	239	74.5%
7. SOUTH BRISTOL BAY					
1 Egegik	86	Census	32	29	90.6%
2 King Salmon	108	Census	29	20	69.0%
3 Levelock	87	Census	43	32	74.4%
4 Naknek	236	Two Strata	94	48	51.1%
5 Pilot Point	46	Census	27	26	92.6%
6 Port Heiden	86	Census	27	18	66.7%
7 South Naknek	108	Census	30	26	66.7%
Region Total	756		282	198	70.2%
8. NORTH BRISTOL BAY					
1 Aleknagik	164	Census	39	30	76.9%
2 Clark's Pdnt	53	Census	18	17	94.4%
3 Dillingham	1126	Two Strata	457	66	12.3%
4 Manokotak	368	Two Strata	77	60	64.9%
5 Togiak	535	Two Strata	121	63	62.1%
Region Total	2235		712	216	30.3%
9. LAKE ILIAMNA					
1 Iliamna	62	Census	20	16	76.0%
2 Newhalen	161	Census	32	26	81.3%
Region Total	213		52	41	78.8%
TOTAL	**37678**		**3710**	**2105**	**56.7%**
(Excl. Anchorage)	**(23,109)**		**(3,691)**	**(2,095)**	**(56.8%)**

TABLE 3
SAMPLING METHODOLOGY FOR COMMUNITIES
WITH **TWO** STRATA DESIGNS,
HARBOR SEAL AND SEA LION SURVEYS, 1992

Community	Numkr High Stratum Households	Sampled Hlgh Stratum Households	Percent High Stratum	Numkr Low Stratum Households	Sampled Low Stratum Households	Percent Low Stratum
Cordova	15	12	60.0%	166	30	18.1%
Seldovia	6	6	**100.0%**	**48**	**30**	62.5%
Seward	10	10	**100.0%**	147	**29**	19.7%
Kodiak Clty	54	40	**90.7%**	266	**15**	5.6%
Old Harbor	60	38	76.0%	32	**25**	78.1%
Port Lions	13	12	62.3%	46	42	01.3%
King Cove	8	6	75.0%	110	66	60.0%
Sand Point	24	14	68.3%	133	77	57.0%
Saint Paul	61	63	**86.9%**	70	31	44.3%
Unalaska	26	21	**80.8%**	61	33	64.7%
Naknek	18	18	100.0%	76	30	**39.5%**
Dillingham	30	24	80.0%	427	32	7.5%
Manokotak	20	20	100.6%	67	30	62.6%
Togiak	52	33	63.5%	63	30	43.5%
Total	**387**	**316**	**81.7%**	**1688**	**489**	**29.0%**

Communities north of Cape Newenham were excluded from the study area because of the relatively low seasonal occurrence of harbor seals and sea lions. Sea lion and harbor seal are more occasionally taken within some communities north of Cape Newenham; however, the relative size and regularity of these harvests are thought to be substantially less than communities south of Cape Newenham. For instance, sea lion are seasonally present along the southwest portion of St. Lawrence Island and are taken certain years by residents of Gambell and Savoonga (Ellanna 1983:350; Little and Robbins 1984). However, we assessed that documenting sea lion and harbor seal takes in the many coastal communities north of Cape Newenham would entail substantial costs for a relatively small number of kills. In addition, seal harvest information above Cape Newenham would be hard to interpret in any event, given the difficulties of knowing what portion of the seals taken are actually harbor seals and not spotted seals. Because northern coastal communities were excluded from the study area, the statewide estimates of sea lion and harbor seal takes should be considered minimum estimates.

For purposes of summarizing information, the communities are grouped into nine regions which share common culture histories (Fig. 1, Table 2). Eighteen surveyed communities lie in the Southeast region, an area whose cultural affinities are predominantly Tlingit, Haida (there are two predominantly Haida communities -- Hydaburg and Kasaan) and Tsimshian (primarily the Metlakatla reservation). The Native population of the Southeast region is relatively large, with 12,581 persons in the 18 sampled communities in 1990. Eight communities lie in the North Pacific Rim region (covering Prince William Sound, the Pacific coast of the Kenai Peninsula, and Kachemak Bay), whose Alaska Native population (about 1,431 persons in 1990) is predominantly Alutiiq (Chugach Eskimo) and Eyak (primarily in Cordova), with some recent immigration of families from other Native groups in Valdez and

Seward. The Upper Kenai-Cook Inlet region covers the historic culture area Of the Cook Inlet Dena'ina; however, most Alaska Natives now living in the urbanized region come from elsewhere in the state. The region's Alaska Native population (16,615 persons in 1990) is widely dispersed, with a few consolidated groups at places like Ekutna, Kenai, Ninilchik, Soldotna, and Tyonek.

The Kodiak Island region encompasses the traditional culture area of the Alutiiq-speaking Koniag Eskimo. It contained seven communities with about 1,652 Natives in 1990, including about 811 Natives living in Kodiak City. The South Alaska Peninsula region covers the historic culture area of the Eastern Aleut and Alutiiq-speaking Peninsula Eskimo groups, including nine communities with about 1,100 Natives in 1990. The subsistence activities of most of this region's communities are oriented toward the Pacific side of the peninsula. The Aleutian-Pribilof region covers four communities on the Aleutian Islands and two on the Pribilof Islands, whose Alaska Natives (about 1,094 people in 1992) are primarily from Aleut cultural traditions. Yup'ik cultural groups are covered by the South Bristol Bay region (seven communities with 756 Natives) and North Bristol Bay region (five coastal communities with 2,235 Natives). The Bristol Bay area was divided into two regions to address the problem of species identification in the overlap areas of spotted and harbor seals. The final region, Lake Iliamna, covers the communities which use fresh water seals in the Iliamna-Lake Clark area, whose populations represent a mixture of Yup'ik, Dena'ina, Alutiiq, and Euro-American cultural traditions. Documenting seal harvests in this region was not part of the study's objectives; however, other ongoing research by the Division of Subsistence allowed for the description of seal harvests by residents of two communities in the region.

Selection of Households for Harvest Surveys

In the 65 communities, systematic interviews were conducted with potential marine mammal hunters living in 2,105 households (Table 2). Households were selected using three main designs, depending upon the community -- census sampling, two-strata random sampling, and chain referral sampling. The type of design used for each community is shown in Table 2.

In 30 communities with less than about 50 Native households, researchers attempted to conduct interviews in all the Native households of the community. This is called census sampling, because all Native households were identified and selected for interviews. Estimates of total community harvests are fairly simple under a complete census design, being the sum of the harvests of each household. Commonly, a small percent of households could not be interviewed (see Table 2), usually because of logistical factors, but also because a few households declined to participate in the interview. In this event, the mean harvest of surveyed households was applied to missing households, producing an estimated expanded community harvest.

For 14 communities with larger Alaska Native populations, a two-strata random sampling design was used (Table 2). A two-strata design makes efficient use of the specialization of marine mammal hunting within a community. Because marine mammal hunting is a fairly specialized activity among community households, the large majority of a community's harvest is produced by a set of very productive hunters in a relatively small number of households. The majority of other households may have hunters that more occasionally take marine mammals, but their total harvests comprise a small portion of the community's total annual harvest. The first stratum was composed of households which were thought to contain active marine mammal hunters (called the high stratum households). The second stratum was composed of all the other households (called the low stratum

households). The classification of households into one or the other stratum was done with the help of key respondents. Local research assistants and community leaders were asked to classify households into the two groups -- Alaska Native households with active marine mammal hunters and all other Alaska Native households.

An efficient survey strategy was followed based on the household classifications. Researchers attempted to interview all households with active marine mammal hunters (a census survey). From the low stratum, a random sample of about 30 households was drawn for interviews (see Table 3). Estimates of harvest numbers and variance are made for each group separately, with unsurveyed households receiving the mean of the households from their respective stratum. The total community harvest is the sum of the two strata.

For all eighteen communities in the populous Southeast region and the two large urban areas, Anchorage and the Kenai Peninsula, a one-stratum, chain referral design was used. Key respondents were asked to identify households of relatively productive marine mammal hunters in the community. Researchers attempted to interview all households within this group. Following an interview, a chain referral technique was used, where each surveyed household was also asked to identify any other marine mammal hunting household not yet identified by the researcher. These households were added to the list and interviewed in a similar fashion until no new referrals were identified. The final list of households represented the universe of hunting households for the community. Expansion methods for harvest numbers are the same as for the census sample in small communities.

The chain referral method was used in culturally-mixed areas with large Alaska Native populations (Southeast region, 12,581 Natives; Anchorage, 14,569 Natives; Kenai, 1,904 Natives). The development of complete Native household lists for random sampling purposes is more difficult (and at times, unfeasible) in

these areas in comparison with areas with smaller Native populations. Also, the unbalanced ratio of researchers to households makes for potentially unwieldy interview schedules if straight random draw methods are used.

At the study's onset, it was believed that the group of marine mammal hunting households in these populous areas might be relatively circumscribed, and their identification through chain referral a straightforward activity. In retrospect, it was difficult to identify marine mammal hunting households in the sprawling urban areas around Anchorage and the Kenai Peninsula. Hunting households typically stated that they did not know of other hunting households like them in the urban area. To what extent this actually reflects a low number of hunters or the anonymity of urban life is difficult to assess.

In the Southeast region it was easy to identify seal hunting households through the chain referral method. The relatively large seal harvests documented in the Southeast region shows the success of the method for finding harvesting households. However, it also suggests that a two-strata design may have documented some additional seal kills by households placed in a low-stratum group. Because it may have missed some less active harvesters, the chain referral method in the Southeast region may have been subject to some sampling bias which resulted in a lower take estimate for harbor seals. A two-strata design might have resulted in a somewhat higher take estimate, if it had picked up any additional harvests through a low stratum random draw.

Sampling Fractions and Statistical Analysis

For communities with census sampling, 87 percent of all Native households were successfully contacted and interviewed during the first study year. For communities with chain referral sampling, 80 percent of households on the chain

referral list were successfully contacted and interviewed. For communities with two-strata designs, 82 percent of high stratum household were successfully contacted and interviewed, while a 29 percent random sample of low stratum households were interviewed (Tables 2 and 3).

These are very high sampling fractions for studies using survey methodologies which rely upon voluntary participation by surveyed households. Overall, the level of cooperation by households in the harvest survey was high in all communities. The non-response rate was primarily due to logistical problems in contacting households, rather than refusals to participate.

In the appendices, the statistical analysis presents harvest data in three different tables for each community. In the first table, the unexpanded reported take is presented for each community. The table of unexpanded numbers represents actual animals reported killed by surveyed hunters, so there are no fractions of animals. The second table presents the combined estimated expanded take for each stratum in the community. In this table, takes of surveyed hunters are expanded to unsurveyed hunters within the stratum, using different methods depending upon the household sampling design as described above. In this expansion, the proportions of the seasonal takes of the surveyed households are preserved, so takes with unknown months exist in the table. The expansion treats each community as a separate sampling universe. Fractions of animals commonly result from the expansion, which are rounded to the nearest tenth. The third table presents a seasonally adjusted expanded take. In this table, the takes with unknown months are assigned to months based on the proportion of the known take. The numbers in this third table form the basis for the numbers in the report's narrative.

The calculation of the confidence range around the estimate is done for each community separately. The confidence intervals were calculated according to the

methods for stratified samples following Cochran (19775.13, 5.15). The confidence range takes into account possible statistical effects of household sampling. In census sampling or random draw sampling, it is possible that certain high or low harvesters are disproportionately selected by chance. The extent of the effects of this potential sampling bias is reflected by the size of the confidence range. Confidence intervals are relatively larger when there is greater variation between households in take. Substantial between-household variation is the rule with marine mammal hunting, which tends to be a specialized subsistence activity within a community. Because of this substantial variation, a high statistical variance occurs, which results in the relatively large confidence intervals despite the high household sampling fractions. Predictably, a certain percentage of households will be missed in any harvest survey, so confidence ranges of this magnitude are probably inherent to estimates of subsistence takes of harbor seals and sea lions.

The confidence ranges of each community were summed to produce the confidence ranges of each region and for the state as a whole. In this process, the unexpanded, reported take was used as the lower range for a community if it was higher than the statistically-calculated lower take estimate. This was done because the unexpanded take represents known (not hypothetical) kills.

Kev Respondent Interviews

Semi-structured, key respondent interviews with local marine mammal experts was a second method used for gathering information on the annual harvests of sea lion and harbor seal by communities. Key respondent interviewing is the preferred methodology for collecting information on general patterns of subsistence use within a community (cf. Nakashima 1990). In each community, key respondents who were particularly knowledgeable about sea mammals were identified with the help of local leaders. Researchers attempted to interview at

least two key respondents per community. Key respondents were paid by the hour for interview sessions. Interview sessions were recorded on tape when possible and in hand-written notes. Summary transcription of the interviews were made and entered into computerized fieldnote software system (ASK SAM), key-worded for later search and retrieval during data analysis. Interviews followed a semi-structured format, covering a wide range of topics. For this report, key respondent information was analyzed to describe the uses made of sea lion and harbor seal in each community.

THE SUBSISTENCE TAKE OF HARBOR SEAL IN 1992

Estimated Size of the Harbor Seal Take, 1992

The estimated size of the total take of harbor seals *(Phoca vitulina)* by Alaska Natives in 1992 is presented in Tables 4 and 5. In 1992, there were an estimated 2,867 harbor seals taken by Alaska Natives for subsistence uses (with a 95 percent confidence range of between 2,317 to 3,677 animals) (Table 4). Of the 1992 subsistence take, 11.9 percent (342 harbor seals) were struck and lost, and 88.1 percent (2,525 harbor seals) were harvested.

The numbers in Table 4 are our best estimates of the size of the total take of harbor seals by Alaska Natives in 1992. However, in addition to this take, there were an estimated 34 fresh water harbor seals taken in Lake Iliamna in 1992 by hunters in two communities (Newhalen and Iliamna) (Table 5). In this report, the fresh water seal population of Lake Iliamna are treated as distinct from the salt water harbor seal population of the Pacific and Bering Sea waters, so they have been excluded from the statewide take estimate. Estimating the size of the take of fresh water seals was not an objective of this current study. The estimate of 34 seals in 1992 is probably low, because there were no interviews done with hunters in four other communities along Lake Iliamna or Lake Clark (Igiugig, Kakhanok, Nondalton, and Pedro Bay), where fresh water seals may be used.

The total state estimate for harbor seals is necessarily somewhat indeterminate because of species identification problems in the Bristol Bay area. As discussed further below, in Bristol Bay there are areas with seasonal geographic overlap of *Phoca vitulina* and *Phoca largha*; the indigenous Yup'ik taxonomies categorize adults of the two Linnaean species as a single type (*issuriq*). Of the total North Bristol Bay take, we classified 71 seals as *Phoca vitulina* and 437 as

TABLE 4
ESTIMATED SUBSISTENCE TAKES OF
HARBOR SEAL (PHOCA VITULINA) AND
SEA LION (EUMETOPIAS JUBATUS)
BY ALASKA NATIVES, 1992

	Harvest	Struck and Lost	Total Take	Lower and Upper Confidence Range
Harbor Seal	2,525 (88.1%)	342 (11.9%)	2,867 (100.0%)	2,317-3,677
Sea Lion	369 (67.3%)	179 (32.7%)	548 (100.0%)	452-711

Source: Division of Subsistence, Alaska Department of Fish and Game

TABLE 5
REGIONAL DISTRIBUTION OF SUBSISTENCE TAKES OF HARBOR SEAL (PHOCA VITULINA)* BY ALASKA NATIVES, 1992

Region	Struck Harvest	Struck and Lost Take		Percent	Per Capita Struck and Harvest	Lost Rate
Southeast	1481.3	189.4	1670.7	58.3%	0.12	11.3%
North Pacific Rim	397.4	33.4	430.8	15.0%	0.20	7.8%
Upper Kenai-Cook Inlet	51.6	0.0	51.6	1.8%	0.19	0.0%
Kodiak Island	225.5	15.6	241.1	8.4%	0.13	6.5%
South Alaska Peninsula	115.5	13.1	128.6	4.5%	0.08	10.2%
Aleutian-Pribilof	96.6	22.5	119.2	4.2%	0.09	18.9%
South Bristol Bay	99.0	55.1	154.1	5.4%	0.11	35.8%
North Bristol Bay	57.6	13.1	70.7	2.5%	0.02	18.5%
ALASKA	2524.5 (88.1%)	342.2 (11.9%)	2866.8 (100.0%)	100.0%		11.9%

*Additional Seals (See Text)	Struck Harvest	Struck and Lost Take		Per Capite Struck end Harvest	Lost Rete
Lake Iliamna Freshwater Seals	34.1	0.0	34.1	0.14	0.0%
North Bristol Bay Phoca Largha	364.9	72.5	437.4	0.13	16.6%
TOTAL ADDITIONAL SEALS	399.0	72.5	471.5		15.4%
TOTAL HIGH ESTIMATE	2923.5 (87.6%)	414.7 (12.4%)	3338.3 (100.0%)		12.4%

Source: Division of Subsistence, Alaska Department of Fish and Game

Phoca largha, based on ecological features of the kill (degree of association with seasonal ice) (see Table 5). Of the animals classified as *Phoca largha, 16.6* percent (72 animals) were reported struck and lost, and 83.4 percent (365 animals) were harvested (Table 5). In Table 4, we also assumed the entire South Bristol Bay take of 154 animals was *Phoca vitulina*.

Changing these assumptions will change the total statewide take estimate up or down. For instance, if all the takes in North Bristol Bay are assumed to be *Phoca vitulina* (which we consider a poor assumption based on the available ecological information), then the total Alaska take of harbor seals in 1992 is increased to 3,304 animals. If the takes of Lake Iliamna fresh water harbor seals are added in as well, the total Alaska take of harbor seals in 1992 by Alaska Natives is increased to 3,338 harbor seals (Table 5). Alternatively, if all of the seal takes in North Bristol Bay and South Bristol Bay are assumed to be *Phoca largha* (which we also consider a poor assumption), and fresh water seals are excluded, then the total Alaska take of harbor seal in 1992 by Alaska Natives is decreased to 2,642 harbor seals. As stated above, we believe the best estimate is 2,867 harbor seals, based on the assumptions in Table 4.

Geoaraohic Distribution of Harbor Seal Takes

Table 5 shows the regional distribution of harbor seal takes by Alaska Natives in 1992. The largest takes in terms of absolute numbers were taken by the Tlingit and Haida of the Southeast region. About 58.3 percent of the statewide take of harbor seals (1,671 animals), were taken by hunters in Southeast Alaska (Table 1). The regions ranked second and third were the North Pacific Rim (431 seals, or 15.0 percent of the statewide take) and Kodiak Island (241 seals, or 8.4 percent of the statewide take). The remainder of the statewide harbor seal take (524 animals, or 18.3 percent) was distributed among the other 6 regions.

TABLE 6

SUBSISTENCE HARBOR SEAL HARVEST, TAKE, AND USE BY ALASKA NATIVES, 1992 WITH CONFIDENCE INTERVALS AND STATISTICAL RANGES, BY COMMUNITY

Community	Percent of Native Households Harvesting Harbor Seal	Percent of Native Households Using Harbor Seal	Harbor Seal Harvested	Harbor Seal Struck and Lost	Total Harbor Seal Take	Confidence Interval (+/- %)	Lower Range Estimate	Upper Range Estimate	Harbor Seal Harvested Per Capita
SOUTHEAST									
Angoon			125.1	28.9	154.0	18%	133.0	181.9	0.24
Cmig			74.2	0.0	74.2	17%	84.0	86.8	0.26
Hainea			30.5	7.9	38.4	20%	34.0	46.3	0.11
Hoonah		--	356.2	24.8	375.0	20%	301.5	448.5	0.88
Hydaburg			30.0	2.1	32.1	27%	30.0	40.9	0.09
Junaau			122.6	7.6	130.2	23%	103.0	159.7	0.04
Kake			173.9	12.3	186.2	18%	167.0	220.1	0.34
Kaaaan			0.0	0.0	0.0	0%	0.0	0.0	0.00
Ketchikan			90.2	6.5	96.8	52%	74.0	147.2	0.06
Klawock			39.0	1.4	40.3	48%	29.0	59.7	0.10
Klukwan			8.0	2.0	10.0	0%	10.0	10.0	0.07
Metlakatla			1.3	0.0	1.3	98%	1.0	2.6	0.00
Pelican			12.9	1.3	14.1	39%	11.0	19.7	0.20
Petersburg			22.4	2.8	25.0	38%	19.0	34.5	0.07
Saxman			22.2	1.2	23.5	38%	19.0	31.9	0.08
Sitka			124.7	21.4	146.1	18%	120.4	171.7	0.07
Wrangell			6.0	6.0	14.0	139%	7.0	33.4	0.01
Yakutat			248.0	61.3	309.3	25%	232.0	388.0	0.84
NORTH PACIFIC RIM									
Chenega Bay	25.0%	85.0%	42.6	2.3	44.9	39%	39.0	62.2	0.52
Cordova	23.8%	47.6%	103.8	8.8	112.5	22%	90.0	136.9	0.21
Nanwalek	20.0%	76.7%	27.9	0.0	27.9	40%	22.0	39.0	0.16
Port Gmham	29.2%	93.8%	58.0	4.7	60.7	25%	52.0	75.9	0.35
Seldovia	13.9%	22.2%	12.4	0.0	12.4	37%	10.0	17.0	0.08
Seward	2.6%	20.5%	2.0	0.0	2.0	0%	2.0	2.0	0.00
Tatitlek	44.0%	96.0%	152.9	17.7	170.6	18%	164.0	201.9	1.62
Valdez	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
UPPER KENAI-COOK INLET									
Anchorage			17.1	0.0	17.1	85%	9.0	28.2	0.00
Kenai			33.3	0.0	33.3	75%	25.0	58.5	0.02
Tyonek	2.1%	12.8%	1.1	0.0	1.1	88%	1.0	1.9	0.01
KODIAK ISLAND									
Akhiok	31.8%	68.2%	20.0	3.0	23.0	0%	23.0	23.0	0.28
Karluk	50.0%	58.3%	16.5	1.5	18.0	42%	12.0	25.5	0.23
KodiakCity	10.9%	37.5%	38.9	0.0	38.9	90%	19.0	70.1	0.05
Laraan Bay	8.6%	14.3%	6.5	0.0	6.5	34%	6.0	8.7	0.05
Oid Harbor	25.4%	81.0%	86.8	7.8	94.7	25%	72.0	117.9	0.30
Ouzinkie	19.1%	53.2%	21.8	1.1	23.0	28%	20.0	29.3	0.13
Port Lions	13.0%	20.4%	38.9	2.2	39.1	22%	38.0	47.6	0.19

TABLE 6 CONTINUED

SUBSISTENCE HARBOR SEAL HARVEST, TAKE, AND USE BY ALASKA NATIVES, 1992

WITH CONFIDENCE INTERVALS AND STATISTICAL RANGES, BY COMMUNITY

Community	Percent of Native Households Harvesting Harbor Saal	Pcrcant of Native Households Using Harbor Seal	Harbor Seal Hawaatad	Harbor Seal struck and Lost	Total Harbor Seal Take	Confidence Interval (+/- %)	Lower Range Eattmate	Upper Range Estimate	Harbor Seal Harvested Per Capita
SOUTH ALASKA PENINSULA									
Chiinik Bay	7.7%	38.5%	2.4	1.2	3.6	58%	3.0	5.8	0.02
Chinik Lagoo	10.5%	10.5%	4.0	0.0	4.0	0%	4.0	4.0	0.07
Chignik Lake	20.0%	53.3%	8.3	2.1	10.3	15%	10.0	11.8	0.07
False Paaa	35.3%	82.4%	18.0	0.0	18.0	22%	17.0	22.0	0.34
Ivanof say	82.5%	100.0%	10.0	1.0	11.0	0%	11.0	11.0	0.31
King cove	16.4%	34.4%	28.0	6.7	32.7	41%	19.2	46.1	0.08
Nelson Lagoon	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Perryville	18.5%	92.6%	8.9	2.2	11.1	30%	10.0	14.4	0.08
Sand Point	14.3%	24.2%	37.9	0.0	37.9	40%	22.8	53.0	0.07
ALEUTIAN-PRIBILOF ISLANDS									
Akutan	14.3%	78.8%	12.9	4.3	17.1	27%	16.0	21.7	0.16
Atka	25.0%	80.0%	28.6	9.9	38.5	30%	35.0	50.0	0.42
Nikolski	16.7%	91.7%	5.8	3.5	9.3	42%	8.0	13.2	0.24
Saint George	0.0%	2.4%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Saint Paul	2.4%	7.1%	2.3	1.2	3.5	40%	3.0	4.8	0.00
Unalaska	20.4%	59.3%	47.0	3.7	50.8	27%	40.0	64.4	0.20
SOUTH BRISTOL BAY									
Egagik	6.9%	37.9%	3.3	14.3	17.7	40%	16.0	24.7	0.04
King Salmon	15.0%	35.0%	10.2	0.0	10.2	79%	7.0	18.2	0.11
Levelock	18.8%	56.3%	10.8	0.0	10.8	40%	8.0	15.0	0.09
Naknek	12.5%	45.8%	26.6	7.0	33.6	19%	29.0	40.1	0.09
Pilot Paint	16.0%	48.0%	5.4	4.3	9.7	21%	9.0	11.7	0.06
Port Hekkn	38.9%	83.3%	40.5	22.5	63.0	57%	42.0	98.9	0.47
South Naknek	7.7%	61.5%	2.3	6.9	9.2	48%	8.0	13.7	0.02
NORTH BRISTOL BAY									
Aleknagik	23.3%	93.3%	0.0	3.8	3.6	30%	3.0	4.7	0.00
Clark's Paint	23.5%	52.9%	0.0	0.0	0.0	22%	0.0	0.0	0.00
Dillingham	25.0%	80.4%	29.2	3.8	32.9	68%	11.2	54.6	0.02
Manokotak	20.0%	98.0%	4.9	3.8	8.7	80%	6.0	13.9	0.01
Togiak	63.5%	93.7%	24.3	2.0	26.3	16%	22.2	30.4	0.04
ALASKA TOTAL			2525.3	342.4	2867.7	28%	2317.4	3676.5	
SPOTTED SEALS. NORTH BRISTOL BAY									
Aleknagik	23.3%	93.3%	26.6	5.5	34.1	30%	28.0	44.2	0.20
Clark's Point	23.5%	52.9%	10.6	8.5	19.1	22%	18.0	23.2	0.19
Dillingham	25.0%	80.4%	49.6	3.8	53.3	88%	33.0	88.5	0.03
Manokotak	20.0%	98.0%	25.1	1.0	26.1	80%	18.0	41.6	0.07
Togiak	63.5%	93.7%	250.3	53.7	304.1	16%	256.7	351.5	0.45
FRESH WATER HARBOR SEALS, LAKE ILIAMNA									
Iliamna	20.0%	80.0%	10.7	0.0	10.7	74%	8.0	18.5	0.14
Newhalen	30.8%	61.5%	23.4	0.0	23.4	30%	19.0	30.4	0.15
OTHER SEALS			398.3	72.5	470.6	27%	376.7	598.0	
TOTAL WITH OTHER SEALS			2923.6	414.9	3338.5	28%	2696.1	4274.5	

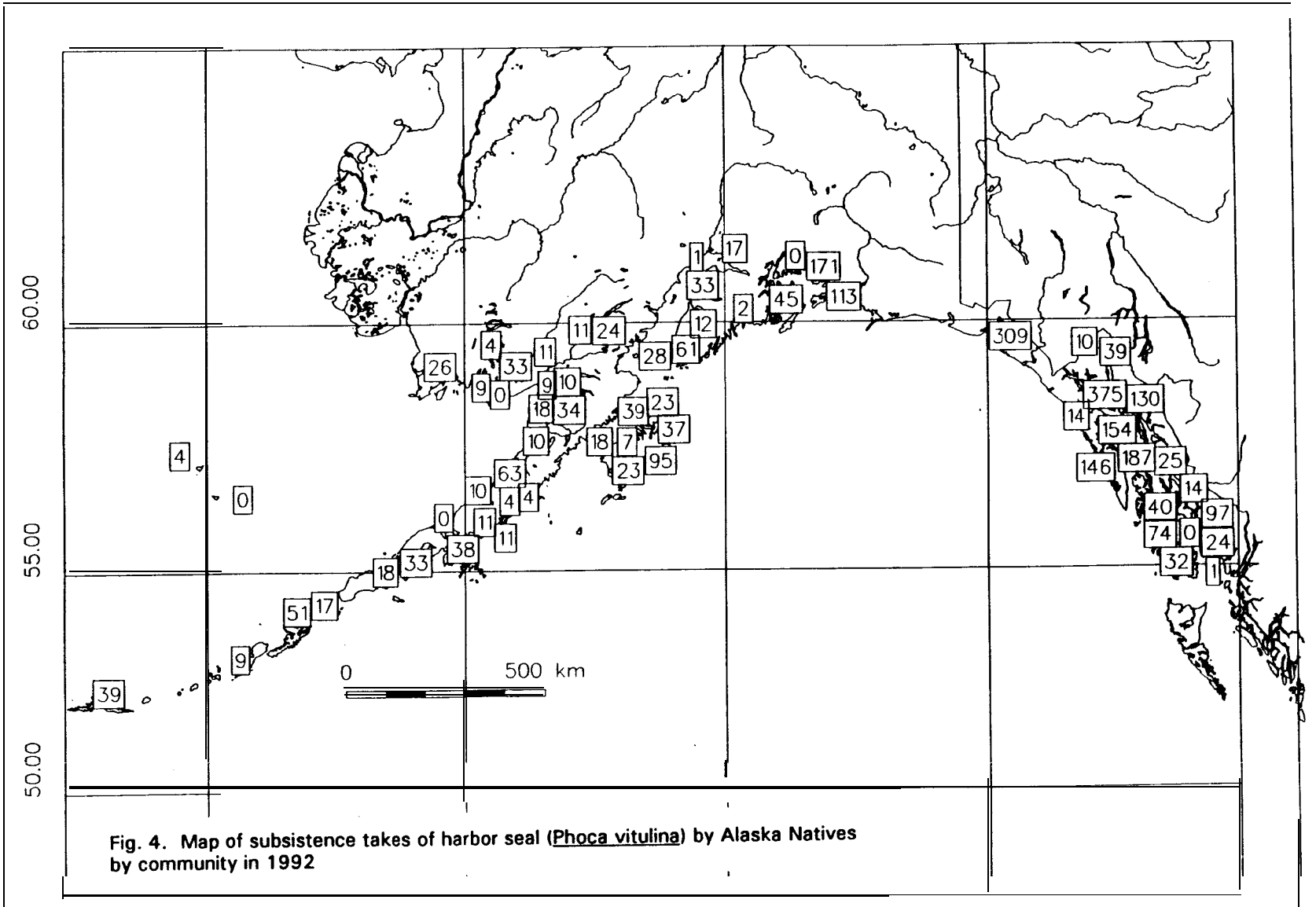
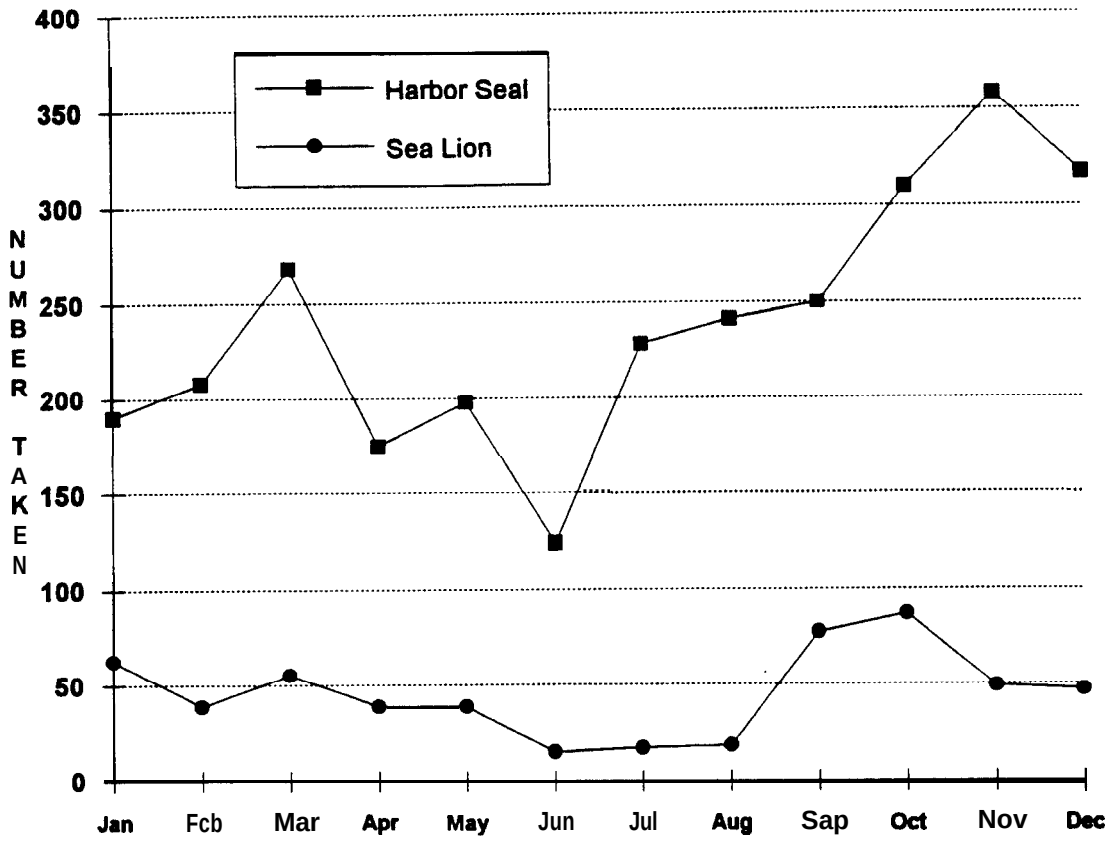


Fig. 4. Map of subsistence takes of harbor seal (Phoca vitulina) by Alaska Natives by community in 1992

FIG. 5
ESTIMATED SEASONALLY ADJUSTED TAKE OF HARBOR SEAL AND SEA LION BY ALASKA NATIVES IN 1992



Adjusted Seasonal Take By Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	N o v	Dec
Harbor Seal	190	208	269	174	198	124	228	241	250	310	358	317
Percent	6.6%	7.3%	9.4%	6.1%	6.9%	4.3%	6.0%	6.4%	6.7%	10.6%	12.5%	11.1%
Cum. Percent	6.6%	13.9%	23.3%	29.3%	36.2%	40.5%	46.5%	56.9%	65.6%	76.4%	66.6%	100.0%
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sap	Oct	N o v	Dec
Sea Lion	63	39	55	39	39	15	17	18	78	87	49	47
Percent	11.5%	7.1%	10.1%	7.1%	7.1%	2.7%	3.1%	3.3%	14.2%	15.9%	9.0%	6.6%
Cum. Percent	11.5%	16.7%	26.6%	35.9%	43.0%	45.6%	48.9%	52.2%	66.4%	62.4%	91.4%	100.0%

The geographic distribution of harbor seal takes by community is shown in Table 6 and Fig. 4. Of the top ten communities (in terms of absolute number of harbor seals taken in 1992). eight were in the Southeast region. The five top ranking communities were Hoonah (375 seals), Yakutat (309 seals), Kake (186 seals), Tatitlek (171 seals), and Angoon (154 seals). Of the communities ranked 6th through 10th, four are relatively large, culturally-mixed communities -- Sitka (146 seals), Juneau (130 seals), Cordova (113 seals), Ketchikan (97 seals), and Old Harbor (95 seals). The median community was Akhiok (23 seals). There were only five surveyed communities with no reported harbor seals taken in 1992 -- Kasaan, Valdez, Nelson Lagoon, St. George, and Clark's Point.

Per capita harvests are the number of harbor seals harvested per Alaska Native living in a community. It is an estimate of the amount harvested per person in an area, controlling for differences in population size. The top ten communities in terms of harvests per capita in 1992 were Tatitlek (1.62 harbor seals harvested per person), Yakutat (0.841, Hoonah (0.661, Chenega Bay (0.521, Port Heiden (0.471, Atka (0.421, Port Graham (0.351, Kake (0.34), False Pass (0.341, and Ivanof Bay (0.31). As shown in Table 6, in terms of per capita harvests, there was greater parity across regions in harbor seal harvests. Among the top ten communities, three were in the Southeast region, three were in the North Pacific Rim region, two were in the South Alaska Peninsula region, and one each was in the South Bristol Bay and Aleutian-Pribilof regions.

Seasonal Distribution of Harbor Seal Takes

The seasonal distribution of the statewide harbor seal take in 1992 is depicted in Fig. 5. Harbor seals were reported killed during every month of 1992. For 8 of 12 months, the monthly takes all fell within a 100-seal range (between about 170 to 270 seals per month). Seasonal peak productivity occurred during

October, November, and December, when monthly takes were between 310 to 360 seals per month (34.4 percent of the annual take). The month of lowest productivity occurred during June.

The statewide total masks differences in seasonal patterns between regions and communities. The regional seasonal patterns are depicted in Appendix B. The community seasonal patterns are depicted in Appendix C.

By and large, the seasonal pattern for communities in the Southeast region drives the statewide pattern, because of the relatively large harvests of harbor seals in that region. Like most coastal areas of Alaska, harbor seals are accessible year-round in the Southeast region. They can be taken for meat and oil whenever a family runs short. Several factors are associated with seasonal highs and lows, as reflected in the following comments from selected hunters from different communities in the Southeast region.

> In almost all hunters' minds first comes the preservation [conservation] of the animals. We make our own rules [regarding seal hunting]. Hunters usually did not take seals in summer because they eat too many fish and the meat and blubber taste like fish. Unless it was very necessary, our hunters did not hunt then. I grew up when many old people in this community relied on seals as part of their diet. I never see anybody harvesting seals after December or January. The reason is that the females are pregnant. Females have their pups the first week of June... From September to late November, and early December you can shoot all the seals you want after which we don't shoot the females. Generally we don't shoot the females anyway.
> Hydaburg 166-100-031393

> We hunt seals in winter, November, December, January, and February. They have more fat on them during these months and their skins are also nicer. They have their pups in June. After February we do not hunt seals anymore.
> Hydaburg 166-101-031393

> We harvest seals during spring season, in March, just before herring eggs. We also harvest seals in the fall. It's because of their diet. In the fall they are bigger. In the spring we harvest seals to get fresh seal oil. We use the seal oil with the fresh herring eggs. We don't hunt in January. In December some people do. Mostly people go in March, April, and then in October, November. By October, people get hungry for it.
> Klawock 100-102-031693

It's traditional to do seal at fish camps [fall].
Kake 176-12-040193

We don't shoot seals at any old time of the year. We shoot when we know they're going to float, not when they're lean in early summer into early winter. November, December..., well, September through March is the best time. And don't hunt them all the time, only when you need them, not because you just got to get as much as you can, not the mainstream concept that you get all that you can right now; because seal oil will get rancid, and if you get too much it will go to waste, and that goes against our value system.
Juneau 174-104-060397-T

Seals float best during winter. After the hooligan come, in early summer, they sink. February, March, it floats. But seals are still harvested during March, April, May. In May it's real fat, but the pups are in it then [fetus inside the females], and we shot just a few at that time. They used the pup skin for trim on all clothes and on hats, and for inside shoes.
Haines 151-100-020993

There are no fixed seasons. It depends on need. If you are primarily interested in the skins, you take it during fall time, right after fall fishing is over [September and October] because that's when their hair is best. They've already lost their summer hair and they're growing their winter hair. But in late spring the molting begins and the hair is no good. If you want to use the meat, spring time, around May, is the best season, still fat but less salmon-fishy taste. If you want the oil, say for herring eggs, then October, November, December, or January are the best months. Only when the pups are being born will everybody leave them alone.
Saxman 301-01-022593

The comments of hunters indicate that the seasonal patterns vary between communities. Preferences for hunting seasons also differ between hunters within the same community. Common factors influencing seasonal patterns mentioned above include the thickness of the fat, the quality of the meat's taste, the avoidance of females carrying near-term fetuses or accompanied by pups, the desire for fresh oil with other seasonal products (herring eggs), the quality of the skins, and seasonal cravings, all factors that vary over an annual cycle. Seasonal patterns in communities in other regions are influenced by sets of factors like these.

TABLE 7
AGE AND SEX DISTRIBUTION
OF HARBOR SEAL HARVESTS
BY ALASKA NATIVES, 1992

	Male	Female	Unknown Sex	Total
Adult	894.2	408.8	516.5	1819.5
Row Percent	49.1%	22.5%	28.4%	100.0%
Column Percent	04.7%	85.3%	50.5%	71.1%
Juvenile	134	61.2	170.6	365.8
Row Percent	36.6%	16.7%	46.6%	100.0%
Column Percent	12.7%	12.8%	16.7%	14.3%
Pup	6.7	4.3	26.8	37.8
Row Percent	17.7%	11.4%	70.9%	100.0%
Column Percent	0.6%	0.9%	2.6%	1.5%
Unknown Age	20.5	4.9	309.8	335.2
Row Percent	6.1%	1.5%	92.4%	100.0%
Column Percent	1.9%	1.0%	30.3%	13.1%
Total	1055.4	479.2	1023.7	2558.3
Row Percent	41.3%	18.7%	40.0%	100.0%
Column Percent	100.0%	100.0%	100.0%	100.0%

TABLE 8
AGE AND SEX DISTRIBUTION OF HARBOR SEAL HARVESTS
BY ALASKA NATIVES IN 1992 BY REGION

AGE AND SEX	Southeast	North Pacific Rim	Upper Cook Inlet	Kenai-Kodiak island	South Alaska Peninsula	Aleutian-Pribilof	South Bristol Bay	North Bristol Bay	Lake Iliamna	Alaska
Adult Male	618.2	119.6	6.5	68.8	40.6	23.9	6.6	10.0	0.0	894.2
Adult Female'	285.8	45.9	5.7	42.8	6.8	8.1	10.5	3.2	0.0	408.8
Adult Unknown Sax	279.2	39.2	25.7	32.4	49.6	10.4	45.1	34.9	0.0	516.5
Juvenile Male	60.4	14.6	1.3	27.6	3.1	24.3	1.1	1.6	0.0	134.0
Juvenile Female	15.4	16.5	0.0	10.8	0.0	17.4	1.1	0.0	0.0	61.2
Juvenile Unknown Sex	68.6	28.9	12.4	30.9	7.3	8.2	9.9	4.4	0.0	170.6
Pup Male	2.4	2.1	0.0	0.0	0.0	2.2	0.0	0.0	0.0	6.7
Pup Female	1.1	1.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	4.3
Pup Unknown Sex	3.9	13.0	0.0	1.3	0.0	0.0	7.0	1.6	0.0	26.8
Male Unknown Age	0.0	5.9	0.0	0.0	1.1	0.0	0.0	0.0	13.5	20.5
Female Unknown Age	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	4.9
Unknown Age and Sex	146.2	110.7	0.0	10.8	7.0	0.0	17.6	1.9	15.6	309.8
TOTAL	1481.2	397.4	51.6	225.4	115.5	96.7	98.9	57.6	34.0	2558.3
AGE ONLY										
Adult	1183.2	204.7	37.9	144.0	97.0	42.4	62.2	48.1	0.0	1819.5
Juvenile	144.4	60.0	13.7	69.3	10.4	49.9	12.1	6.0	0.0	365.8
Pup	7.4	16.1	0.0	1.3	0.0	4.4	7.0	1.6	0.0	37.8
Unknown Age	146.2	116.6	0.0	10.8	8.1	0.0	17.6	1.9	34.0	335.2
TOTAL	1481.2	397.4	51.6	225.4	115.5	96.7	98.9	57.6	34.0	2558.3
SEX ONLY										
Male	681.0	142.2	7.8	96.4	44.8	50.4	7.7	11.6	13.5	1055.4
Female	302.3	63.4	5.7	53.6	6.8	27.7	11.6	3.2	4.9	479.2
Unknown Sex	497.9	191.8	38.1	75.4	63.9	18.6	79.6	42.8	15.6	1023.7
TOTAL	1481.2	397.4	51.6	225.4	115.5	96.7	98.9	57.6	34.0	2558.3

Aae and Sex Distribution of Harbor Seal Harvests

The estimated age and sex distributions of the 1992 harbor seal harvests are shown in Tables 18 and 19 by geographic region. Hunters reported harvesting male harbor seals over female harbor seals about 2 to 1. Hunters also reported harvesting substantially more adult harbor seals than juveniles or pups (4.5 to 1). Overall, adult females comprised about 16 percent of the total known harvest of harbor seals in 1992. It is noteworthy that hunters did not report the sex for about 40 percent of the harvest or age for about 13 percent of the harvest. The age and sex also are unknown for animals which were struck and lost.

Contemoorary Subsistence Uses of Harbor Seal

Harbor seals are used by Alaska Natives almost everywhere in their range. They are used primarily for food, with several other non-food uses as well. The edible parts of harbor seals can be classified into four major groups -- the meat, the fat and oil, the flippers, and the internal organs. Virtually every part of the animal is deemed edible by certain people except the hide, the skeleton, the stomach, and certain parts of the head.

Regional differences in use are less pronounced with harbor seals than with sea lions. Regional differences appear to be reflections of distinct cultural preferences between groups. For harbor seals as well as for Steller sea lions, it is important to note that our 1992 calendar year survey did not ask each hunting household about the parts normally consumed. Consequently, the summary of harbor seal uses that follows is derived primarily from the expert testimony of key respondents in each community. We cannot say what percentage of families used particular types of products. Also, this summary does not portray the full range of variation in use within communities.

Harbor Seal Meat

Seal meat is dark, rich in blood when fresh, and somewhat oilier than sea lion meat. When air dried, the meat turns almost black. There are a number of ways to prepare seal meat, based on the comments of respondents. Many hunters soak the blood out of seal meat in fresh cold water before cooking, and others boil the meat to get the blood and the wild taste out. There are some who are very critical of this practice, saying that it destroys the flavor of the meat.

Today seal meat is usually stored in freezers, but in some parts of Bristol Bay seal meat is still dried and taken to fish camps in the summer. Inflated seal stomachs or "pokes" were once widely used to store seal oil, dried fish, deer meat, berries, and herring roe, but pokes have been replaced with glass jars and plastic containers. Harbor seal meat is eaten year round. Some Yup'ik hunters in northern Bristol Bay say that the meat of older adult males is too strong-tasting during the early summer rutting season.

Seal meat is often salted, particularly in Kodiak Island villages, and salting preserves the meat quite well for up to a year. Salting is another effective way of getting the blood out of the meat. After being salted, seal meat needs to soak for three or four days in fresh water before it is cooked and eaten.

In Ouzinkie, the ribs and brisket are cited as two of the favorite cuts of seal meat. Oven roasting in a big pan is the most common method of preparing the ribs, but boiling them with vegetables is also widely enjoyed. In Perryville, the local Alutiiq name for the thin pieces of seal meat sliced off the fat layer is *qiaq,* which translates as "cry meat."

In Prince William Sound, the favorite way to eat seal meat is roasted outdoors over an open fire, which is called *mungyuk,* and gathering people on the beach to barbecue seal meat is called *"mungyuking."* In Chenega Bay, for example, they smoke the seal first, cut it up and wrap it in aluminum foil with some onions,

and then set it on hot coals.

Harbor seal meat continues to be an important ceremonial food. In Southeast Tlingit communities, seal meat is considered an essential item for potlatches, especially memorial potlatches, where at least three seals are needed to make a feast. Seal meat is served at potlatches when it is one of the favorite foods of the deceased. One of the favorite potlatch dishes in Angoon includes seal meat and seal fat, deer meat, dry fish, and cockles, all cooked up together in one big pot. Yup'ik families serve harbor seal meat when they have large gatherings such as birthday feasts and dance festivals. Alutiiq families in Lower Cook Inlet serve seal meat and seal oil to celebrate birthdays and name days, although some families abstain from all sea mammals during Lent. In Kodiak Island communities seal meat is important for celebrating certain Russian Orthodox religious holidays.

Harbor Seal Oil

Seal oil is a high caloric food source. In rural Alaska, where wild protein sources are plentiful and good caloric sources comparatively scarce, seal oil is more highly prized than seal meat by most Native groups. It has been a common trade item historically. Seal oil is the quintessential coastal food. It is used as a dip for a wide range of foods, including smoked or dried fish, herring eggs, moose, caribou, seal, sea lion, and wild celery. It is commonly an ingredient in soup stocks. It is also poured over boiled potatoes like gravy.

The thick insulating layer of fat between a harbor seal's skin and its meat is largely what causes the animal to float to the surface after it is shot. During the winter months the insulating layer of seal fat or blubber between the skin and the meat averages about 2 to 3 inches thick. In Bristol Bay hunters note that the blubber on seals is much thinner than it used to be. The "skinny seals" yield less oil.

There are three basic methods for rendering harbor seal oil or grease from the blubber. One basic method of rendering, preferred by the Yup'ik, is to cut the fat into strips and store it in a closed or covered container in a cool area, where it slowly liquifies. Seal oil processed this way keeps well for up to a year and stays clear when refrigerated or stored in a dark cool location inside quart mason jars or white plastic buckets. Some people also freeze seal oil to preserve it.

One man in Naknek said he lets the seal fat render in a plastic bucket at about 40 degrees Fahrenheit for seven to ten days. After that time, the oil must be separated from the fat to avoid going rancid. But some Yup'ik families store their seal fat in glass jars near a warm stove, where it turns dark and develops a distinct, strong flavor. Oil can quickly become rancid without specialized knowledge about the right temperature and the length of time it is left to ferment. Some families produce a strong-smelling and strong-tasting product called "stink oil."

A second common method for rendering seal oil, preferred by some Alutiiq, Aleut, and Tlingit families, is to put the seal fat in a hot frying pan and melt it on the stove. Some people add a little water to the pan to prevent the fat from burning. The oil collected from this process ranges from clear to a slight amber and has a much milder flavor than the slowly rendered oil, especially if it is filtered through a porous cloth. Some leave a little meat on the fat when they fry it, and the crisp chewy chunks of meat left over from frying (called "popcorn" in Southeast or "cracklings" on Kodiak Island) are also considered a delicacy. One Pelican man says he smokes his seal blubber before frying it.

One respondent in the Seward area prefers a very mild clear seal oil. He grinds up the seal fat and melts it in a frying pan, then drains it through a dish towel into a jar and stores it by freezing. His favorite way to eat it is as a salad dressing. He adds vinegar and salad seasonings to produce a vinaigrette.

The third basic method for rendering harbor seal oil, mentioned by numerous Southeast families is to simmer the fat in water and skim off the oil. A similar process is used to produce hooligan oil. One respondent in Craig said:

> I do not process the seal until the next day. If you process it right away the oil tastes like Wesson oil. The next day I separate the fat from the meat. You then get the fat off the skin. I cut the fat into cubes, and I put the cubes into a pot with salt water and start to boil it for about 20 minutes, half an hour. When it starts to change color and becomes amber, it is cooked. Some people prefer the oil a little darker. If you don't cook it enough, it can make you sick. I got six gallons of oil with the seal we processed yesterday. It was a full-grown male and weighed about 140 pounds. I will now have enough oil until next year. After cooking, you put the oil in containers and let it sit overnight.

It's commonly believed that seal fat renders more oil when it's allowed to age, from a few days up to a week before it's boiled.

Some residents of the South Alaskan Peninsula, Kodiak Island, and Southeast Alaska dislike the strong smell that seal oil makes in the house while it is being rendered, so the process is done outside in steel pots. Some families buy their oil from friends and relatives, or more rarely, from outlets such as George's Market in Anchorage, which specializes in Native foods.

Harbor Seal Flippers

Seal flippers are a highly prized item and one of the parts most sought after by Alaska Native elders. In Prince William Sound seal flippers are prepared by burning and scraping the hair off, then slitting the skin between the toes and boiling them. In Southeast Alaska the flippers are sometimes pickled in vinegar, like pigs' feet. They are also boiled or roasted or preserved by brining, smoking, or canning. The Tlingit word for boiled seal flipper is *tsaa geeni.* One man in Saxman says he puts sticks between the toes of the flipper and roasts them over an open fire. As the fire singes the hair, he scrapes it off. The next day he does the same thing. Finally, he hangs the flippers in the smokehouse, scrapes them some more, and

then cuts them up and cooks them by boiling. Some Yup'ik families in North Bristol Bay say they like fermented seal flippers. As the flippers are aged, they are stored in a brown paper bag with moss. When ready, the fur and skin are peeled off, and the flippers are either eaten raw or partially cooked.

Harbor Seal Internal Organs

Some families use the intestines of harbor seal. The seal intestines are cleaned, rinsed, and soaked in salt water or vinegar for several days. Then they are braided with strips of fat or meat to make *kolukuyak,* an Alutiiq specialty popular on Kodiak Island, Prince William Sound, South Alaska Peninsula, and Lower Cook inlet. In some communities they like it with hot mustard. This dish is also popular in some Aleut communities and, without the fat, in Southeast communities. In Port Graham and Nanwalek, the braided gut is hung for three days, smoked for two days, hung again for two days, and then boiled before being eaten. In some areas the intestines are stuffed with pieces of meat and fat before they are braided, creating a kind of sausage. By contrast, in most Aleut and Yup'ik communities the harbor seal's intestines are generally not salvaged for food.

In the Southeast region, the seal's heart and liver are cut up into small pieces and fried. One woman in Craig stated that because she believes livers of big male seals may contain too much mercury, she eats livers of only younger animals or females. Some people believe that the heart and liver should be eaten right away and not be frozen. A Saxman hunter makes a rich stew by tossing the seal's liver, intestines, fat, and meat all together in a pot with potatoes and onions.

No surveyed respondents reported using the seal's tongue. Larsen Bay was the only community which reported using seal brains, which are made into head cheese. Some Larsen Bay and Chignik residents reported eating seal lungs, baked with onions and bacon. A Port Graham resident gives this recipe for seal lungs:

After you remove the lungs and cut off the tubes, find the end of the tube and blow into it until the lung turns bright pink. Don't be alarmed if there's blood around your mouth. Pierce lengthwise and push in the hole a piece of seal fat that is an inch thick and the length of the lung. Put in a baking pan and cook for one hour at 350 degrees. Remove from oven, slice, and serve for dinner or snacks.
(From Sawden, 1982).

Other Uses of Harbor Seals

Because they are waterproof, seal skins were once widely used as a covering for kayaks. It took at least six large adult skins to cover one kayak. This use is now very uncommon. Today smaller and younger seals are preferred for making waterproof mukluks, slippers, parkas, and yo-yos, particularly in North Bristol Bay. A Naknek hunter told us that he uses seal skins as a covering for the bottom of his sleds. After the hair has been removed from a skin, he wets it and stretches it over the frame. When it dries it is very tight but still flexible enough to "give" when exposed to the pounding of snow and ice.

Harbor seal skins are used almost everywhere in coastal Alaska for making many hand-sewn craft items such as slippers, hats, vests, hand bags, coin purses, toys, and gloves. Sitka hunters sometimes make resonant dance drums from seal skins, after the hair has been removed. In the month of February, Sitka seal hunters take the white fur of unborn seal pups for moccasin ruffs because they are easy to tan. One hunter estimated that it takes about an hour, and another estimated an hour and a half, to skin a big adult seal properly. This does not include the additional time it takes to scrape the fat off.

In the Southeast region harbor seal whiskers are pressed into spirals and used to decorate ceremonial regalia. Harbor seal whiskers were also used by the Alutiiq on Kodiak Island, who attached them to masks for masquerading during the Russian Christmas and New Year holidays. Harbor seal stomachs were formerly inflated and used to make halibut hook buoys. In Pelican, seal teeth and claws are

sometimes used to make necklaces, bracelets, or other jewelry. One Pelican hunter makes coin purses out of the front flippers.

Before the introduction of candles and lanterns, seal oil was used in Aleut, Alutiiq, and Yup'ik stone lamps to light and heat the insides of dwellings, especially during winter. One elder in Sand Point told us that when he was young they used to boil seal oil and use it to waterproof the shingles on their houses, a practice which came from his father's Finnish ancestors. In Perryville they say some people use seal oil for lubricating hinges and bolts and nuts. Historically, these were major commercial uses of marine mammal oil in Europe. These types of uses are now rare in Alaska.

THE SUBSISTENCE TAKE OF SEA LION IN 1992

Estimated Size of the Sea Lion Take, 1992

The estimated size of the total take of Steller sea lions by Alaska Natives in 1992 is presented in Tables 4 and 9. In 1992, there were an estimated 548 sea lions taken by Alaska Natives for subsistence uses (with a 95 percent confidence range of between 452 to 711 animals) (Table 4). Of the 1992 subsistence take, 32.7 percent (179 sea lions) were struck and lost, and 67.3 percent (369 sea lions) were harvested.

Geographic Distribution of Sea Lion Takes

Table 9 shows the regional distribution of sea lion takes in 1992 by Alaska Natives. By far, the largest takes in terms of absolute numbers were taken by the Aleut hunters of the Aleutian-Pribilof region, about 78.9 percent of the total statewide take of sea lions (432 animals) (Table 9). Other significant takes of sea lions were made by the Alutiiq of the Kodiak Island region (58 animals, or 10.6 percent of the statewide take) and the North Pacific Rim area (30 sea lions, or 5.6 percent of the statewide take). The remainder of the statewide take (27 animals, or 4.9 percent) was distributed among the other 6 regions.

The geographic distribution of sea lion takes by community is shown in Table 10 and Fig. 6. The prominence of the Aleutian-Pribilof area is again demonstrated in these graphics. All six of the Aleutian-Pribilof area communities were in the top ten communities in terms of absolute number of sea lions taken in 1992. The five top ranking communities were Saint Paul (227 sea lions), St. George (70 sea lions), Unalaska (59 sea lions), Old Harbor (46 sea lions), and Atka (39 sea lions). In 1992, 42 of 65 surveyed communities reported no sea lions

TABLE 9
REGIONAL DISTRIBUTION OF SUBSISTENCE TAKES OF SEA LION (EUMETOPIAS JUBATUS) BY ALASKA NATIVES, 1992

Region	Struck and Lost Take			Percent	Per Capita Struck and Harvest Lost Rate	
	Harvest					
Southeast	5.2	1.3	6.4	1.2%	0.00	20.3%
North Pacific Rim	23.9	6.5	30.4	5.6%	0.01	21.4%
Upper Kenai-Cook Inlet	5.7	3.8	9.5	1.7%	0.02	40.0%
Kodiak Island	41.5	16.3	57.6	10.6%	0.02	28.2%
South Alaska Peninsula	2.4	0.0	2.4	0.4%	0.00	0.0%
Aleutian-Pribilof	280.8	151.1	431.9	78.9%	0.25	35.0%
South Bristol Bay	0.0	0.0	0.0	0.0%	0.00	0.0%
North Bristol Bay	7.8	0.0	7.8	1.4%	0.00	0.0%
Lake Iliamna	1.3	0.0	1.3	0.2%	0.01	0.0%
ALASKA	368.6 (67.3%)	179.0 (32.7%)	547.5 (100.0%)	100.0%		32.7%

Source: Division of Subsistence, Alaska Department of Fish and Game

TABLE 10

SUBSISTENCE SEA LION HARVEST, TAKE, AND USE BY ALASKA NATIVES, 1992 WITH CONFIDENCE INTERVALS AND STATISTICAL RANGES, BY COMMUNITY

Region and Community	Percent of Native Households Harvesting Sea Lion	Percent of Native Households using Sea Lion	Sea Lion Harvested	Sea Lion struck and Lost	Total Sea Lion Take	Confidence Interval (+/- %)	Lower Range Estimate	Upper Range Estimate	Sea Lion Harvested Per Capita
SOUTHEAST									
Angoon			0.0	0.0	0.0	0%	0.0	0.0	0.00
Craig			0.0	0.0	0.0	0%	0.0	0.0	0.00
Haines			0.0	0.0	0.0	0%	0.0	0.0	0.00
Hoonah			0.0	0.0	0.0	0%	0.0	0.0	0.00
Hydaburg			0.0	0.0	0.0	0%	0.0	0.0	0.00
Juneau			0.0	0.0	0.0	0%	0.0	0.0	0.00
Kake			0.0	0.0	0.0	0%	0.0	0.0	0.00
Kasaan			0.0	0.0	0.0	0%	0.0	0.0	0.00
Ketchikan			0.0	0.0	0.0	0%	0.0	0.0	0.00
Klawock			1.4	0.0	1.4	104%	1.0	2.8	0.10
Klukwan			0.0	0.0	0.0	0%	0.0	0.0	0.00
Metlakatla			0.0	0.0	0.0	0%	0.0	0.0	0.00
Pelkan			0.0	0.0	0.0	0%	0.0	0.0	0.00
Petersburg			0.0	0.0	0.0	0%	0.0	0.0	0.00
S - n			0.0	0.0	0.0	0%	0.0	0.0	0.00
Sitka			3.8	1.3	5.0	69%	4.0	9.5	0.07
Wrangell			0.0	0.0	0.0	0%	0.0	0.0	0.00
Yakutat			0.0	0.0	0.0	0%	0.0	0.0	0.00
NORTH PACIFIC RIM									
Chenega Bay	20.0%	70.0%	6.9	1.2	6.1	34%	7.0	10.8	0.06
Cordova	0.0%	2.4%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Nanwalek	6.7%	63.3%	6.3	0.0	6.3	74%	5.0	11.0	0.04
Port Graham	2.1%	20.8%	2.3	1.2	3.5	55%	3.0	5.4	0.01
Seldovia	0.0%	2.8%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Seward	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Tatitlek	8.0%	0.0%	8.3	4.2	12.5	27%	12.0	15.9	0.09
Valdez	0.0%	INLET	0.0	0.0	0.0	0%	0.0	0.0	0.00
UPPER KENAI-COOK									
Anchorage			5.7	3.8	9.5	135%	5.0	22.3	0.00
Kenai	0.0%	16.7%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Tyonek	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
KODIAK ISLAND									
Akhiok	9.1%	50.0%	3.0	1.0	4.0	0%	4.0	4.0	0.04
Karluk	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Kodiak City	0.0%	12.5%	0.0	0.0	0.0	0%	0.0	0.0	0.00
LarsenSay	2.9%	2.9%	1.1	0.0	1.1	56%	1.0	1.7	0.01
Old Harbor	17.5%	68.3%	32.9	13.2	46.1	32%	35.0	60.9	0.11
Ouzinkie	4.3%	6.4%	3.4	0.0	3.4	52%	3.0	5.2	0.02
Port Lions	1.9%	1.9%	1.1	2.2	3.2	39%	3.0	4.5	0.01

TABLE 10 CONTINUED

SUBSISTENCE SEA LION HARVEST, TAKE, AND USE BY ALASKA NATIVES, 1992
WITH CONFIDENCE INTERVALS AND STATISTICAL RANGES, BY COMMUNITY

Region and Community	Percent of Native Households Harvesting Sea Lion	Percent of Native Households using See Lion	Sea Lion Harveeted	Sea Lion Struck end Loet	Total Sea Lion Take	Confidence Interval (+/- %)	Lower Range Estimate	Upper Range Estimate	Sea Lion Herveeted Per Capb
SOUTH ALASKA PENINSULA									
Chignik Bay	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Chignik Leg00	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Chignik Lake	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
False Peee	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Ivenof Bay	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
King cove	1.8%	3.3%	1.3	0.0	1.3	98%	1.0	2.8	0.00
Nelson Lagoon	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Perryville	3.7%	25.9%	1.1	0.0	1.1	82%	1.0	1.8	0.01
Send Point	0.0%	1.1%	0.0	0.0	0.0	0%	0.0	0.0	0.00
ALEUTIAN-PRIBILOF ISLANDS									
Akutan	17.9%	96.4%	25.7	4.3	30.0	22%	28.0	38.7	0.31
Atka	25.0%	95.0%	28.8	9.9	38.5	29%	35.0	49.8	0.42
Nikolski	33.3%	68.7%	8.2	0.0	8.2	33%	7.0	10.9	0.33
Saint George	17.1%	73.2%	14.9	55.0	89.9	0%	81.0	94.7	0.09
Saint Paul	44.0%	85.7%	181.7	85.2	228.8	19%	183.5	270.2	0.31
Unebeke	25.9%	70.4%	41.8	18.7	58.5	25%	48.0	73.1	0.10
SOUTH BRISTOL BAY									
Egegik	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
King Salmon	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Levelock	0.0%	3.1%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Naknek	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Pilot Point	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Port Heiden	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
South Naknek	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
NORTH BRISTOL BAY									
Aleknagik	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Clark's Point	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Dillingham	0.0%	3.8%	0.0	0.0	0.0	0%	0.0	0.0	0.00
Menokotek	4.0%	58.0%	3.9	0.0	3.9	68%	3.0	8.5	0.01
Togiak	3.2%	9.5%	3.9	0.0	3.9	100%	2.0	7.7	0.01
LAKE ILIAMNA									
Iliamna	6.7%	8.7%	1.3	0.0	1.3	98%	1.0	2.8	0.02
Newhalen	0.0%	0.0%	0.0	0.0	0.0	0%	0.0	0.0	0.00
ALASKA TOTAL			380.8	179.2	547.5	30%	451.5	710.5	

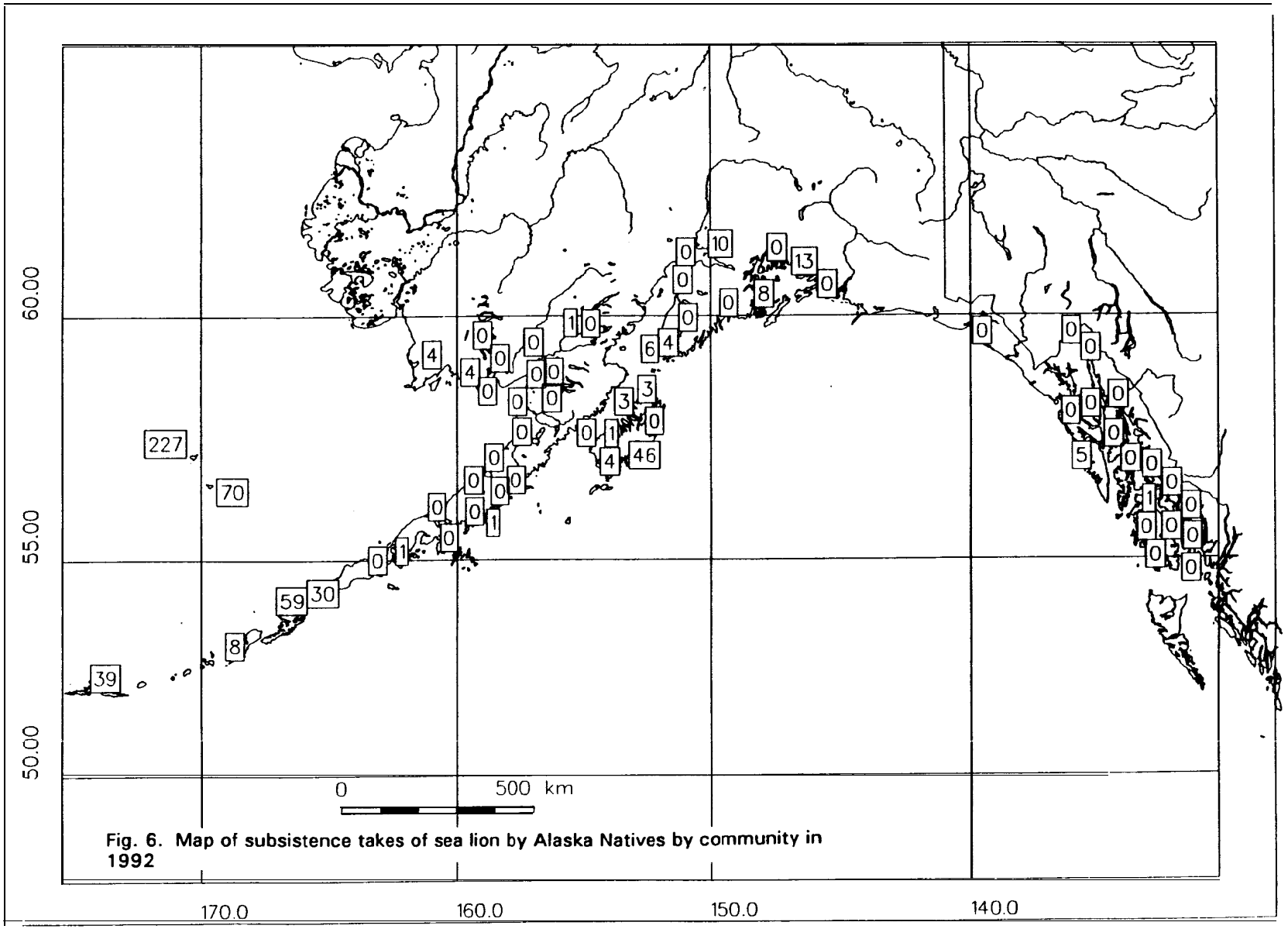


Fig. 6. Map of subsistence takes of sea lion by Alaska Natives by community in 1992

taken. Eleven more communities reported a take of less than 5 sea lions. Only 12 communities had harvests of more than 5 sea lions in 1992. The top six communities accounted for 86 percent of the total Alaska take (470 sea lions). About 54 percent of the total Alaska take occurred in the two Pribilof Island communities of St. Paul and St. George.

In terms of per capita harvests, the Aleutian-Pribilof islands clearly stand out, with 0.25 sea lions harvested per person in 1992 (Table 10). None of the other regions are close to this. At the top was Atka (0.42 sea lions harvested per person), followed by Nikolski (0.331, St. Paul (0.311, Akutan (0.311, Unalaska (0.18). Old Harbor (0.111, Klawock (0.101, Tatitlek (0.09), St. George (0.09), and Chenega Bay (0.08) (Table 10).

Seasonal Distribution of Sea Lion Takes

The seasonal distribution of the statewide sea lion take in 1992 is depicted in Fig. 5. Sea lions were reported killed during every month of 1992. In seven months, the monthly takes all fell between 39 and 63 sea lions. Seasonal peak productivity occurred during September and October, when monthly takes were 78 and 87 animals respectively (30.1 percent of the annual take). Summer (June, July, and August) was the period of lowest productivity (9.1 percent of the annual take).

The statewide total masks differences in seasonal patterns between regions and communities. The regional seasonal patterns are depicted in Appendix B. The community seasonal patterns are depicted in Appendix C. By and large, the seasonal pattern for the Aleutian-Pribilof region drives the statewide pattern, because of the relatively large harvests of sea lions in the region. The seasonal patterns of sea lion takes varied substantially between Aleut communities in 1992, as shown in Appendix C.

The seasonal peak in sea lion takes during September and October reflects the seasonal pattern of take at Saint Paul (see Appendix C). By contrast, takes were highest during January-April at Saint George. At Akutan and Unalaska, sea lion takes were highest during June-July. These seasonal patterns probably reflect factors specific to each community's local ecology, culture, and economy. These differences make it difficult to generalize about the region's overall seasonal pattern.

Aae and Sex Distribution of Sea Lion Harvests

The reported age and sex distributions of the 1992 sea lion harvests are shown in Tables 11 and 12 by geographic region. Hunters reported harvesting male sea lions over female sea lions about 3 to 1. Hunters also reported harvesting about twice as many juvenile sea lions as adults or pups. Adult females comprised about 10 percent of the total known harvest of sea lions in 1992. Hunters did not report the sex for 23 percent of the harvest or age for about 3 percent of the harvest. The age and sex also are unknown for sea lions which were struck and lost.

Contemoorarv Subsistence Uses of Sea Lion

Wherever Steller sea lions are actively hunted by Alaska Natives, the animals are used primarily for food. There are also a few non-food uses. The uses of sea lions mentioned by key respondents during the 1992 harvest survey confirm the literature review by Haynes and Mishler (1991). The parts of sea lions considered suitable for food can be classified into four major groups -- the meat, the fat and oil, the flippers, and the internal organs.

There is considerable variation in taste preference from region to region regarding sea lion, much more in comparison with harbor seal. Among the Aleut,

TABLE 11
AGE AND SEX DISTRIBUTION
OF SEA LION HARVESTS
BY ALASKA NATIVES, 1992

	Male	Female	Unknown Sex	Total
Adult	46.2	35.2	19.9	101.3
Row Percent	45.6%	34.7%	19.6%	100.0%
Column Percent	21.3%	53.3%	23.1%	27.5%
Juvenile	154.4	29.7	49.6	233.7
Row Percent	66.1%	12.7%	21.2%	100.0%
Column Percent	71.3%	45.0%	57.5%	63.4%
Pup	15.9	1.1	5.8	22.8
Row Percent	69.7%	4.8%	25.4%	100.0%
Column Percent	7.3%	1.7%	6.7%	6.2%
Unknown Age	0	0	10.9	10.9
Row Percent	0.0%	0.0%	100.0%	100.0%
Column Percent	0.0%	0.0%	12.6%	3.0%
Total	216.5	66	86.2	368.7
Row Percent	58.7%	17.9%	23.4%	100.0%
Column Percent	100.0%	100.0%	100.0%	100.0%

TABLE 12
AGE AND SEX DISTRIBUTION OF SEA UON HARVESTS BY ALASKA NATIVES IN 1992 BY REGION

AGE AND SEX	Southeast	North Pacific Rim	Upper Cook Inlet	Kenai-Kodiak	Kodiak Island	South Alaska Peninsula	Aleutian-Pribilof	South Bristol Bay	North Bristol Bay	Lake Iliamna	Alaska
Adult Male	1.3	4.3	0.0	8.5	0.0	31.1	0.0	1.0	0.0	48.2	
Adult Female	0.0	7.1	3.8	3.9	0.0	20.4	0.0	0.0	0.0	35.2	
Adult Unknown Sex	2.7	3.8	0.0	4.4	1.3	7.9	0.0	0.0	0.0	19.9	
Juvenile Male	0.0	1.2	0.0	5.1	1.1	141.2	0.0	5.8	0.0	154.4	
Juvenile Female	0.0	4.3	1.9	3.8	0.0	19.7	0.0	0.0	0.0	29.7	
Juvenile Unknown Sex	1.3	0.0	0.0	11.8	0.0	38.5	0.0	0.0	0.0	49.8	
Pup Male	0.0	0.0	0.0	0.0	0.0	14.9	0.0	1.0	0.0	15.9	
Pup Female	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.1	
Pup Unknown Sex	0.0	1.2	0.0	0.0	0.0	4.8	0.0	0.0	0.0	5.8	
Male Unknown Age	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Female Unknown Age	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Unknown Age and Sex	0.0	2.3	0.0	3.9	0.0	3.4	0.0	0.0	1.3	10.9	
TOTAL	5.3	24.0	5.7	41.4	2.4	280.8	0.0	7.8	1.3	368.7	
AGE ONLY											
Adult	4.0	15.0	3.8	18.8	1.3	59.4	0.0	1.0	0.0	101.3	
Juvenile	1.3	5.5	1.9	20.7	1.1	197.4	0.0	5.8	0.0	233.7	
Pup	0.0	1.2	0.0	0.0	0.0	20.8	0.0	1.0	0.0	22.8	
Unknown Age	0.0	2.3	0.0	3.9	0.0	3.4	0.0	0.0	1.3	10.9	
TOTAL	5.3	24.0	5.7	41.4	2.4	280.8	0.0	7.8	1.3	368.7	
SEX ONLY											
Male	1.3	5.5	0.0	13.8	1.1	187.2	0.0	7.8	0.0	216.5	
Female	0.0	11.4	5.7	7.7	0.0	41.2	0.0	0.0	0.0	88.0	
Unknown Sex	4.0	7.1	0.0	20.1	1.3	52.4	0.0	0.0	1.3	88.2	
TOTAL	5.3	24.0	5.7	41.4	2.4	280.8	0.0	7.8	1.3	388.7	

virtually every part of the animal is deemed edible except the head, the hide, the stomach, and the skeleton, In the Aleutian and Pribilof islands, sea lion is preferred over harbor seal, which is considered by many people to be "too bloody." By contrast, in the Southeast region and North Bristol Bay, only a few families seem to relish sea lion meat and most people consider it to be "too tough" or to have a "wild taste" inferior to seal meat. These regional differences are not the result of any obvious economic or ecological factors. They appear to reflect distinct cultural food preferences.

Hunters were not systematically surveyed about the parts of sea lions used in 1992. The summary of uses that follows is based largely on the testimony of key respondents in each community. There appears to be considerable variation among communities and families in the portions of the sea lion that are retained for use. As with harbor seals, we cannot say what percentage of families used particular types of sea lion products. Also, this summary probably does not depict the full range of uses within communities.

Sea Lion Meat

Like harbor seal meat, sea lion meat is dark and dense and has a lot of blood in it. Most Aleut hunters cut the throats and bleed the animals immediately after they have been shot and allow the meat to hang outdoors for two or three days before butchering. Most people also soak the meat overnight to get the blood out before cooking. After butchering, sea lion meat is generally eaten fresh and distributed widely by the successful hunters to other households in their community, but if there is extra, it is stored in freezers. According to one Kodiak Island hunter, "You just can't eat sea lion meat every day. It's too rich and too filling. One or two meals will stick to your ribs for a long time."

Sea lion meat may be roasted, fried, boiled, stewed, smoked, or dried. There are essentially four major cuts of sea lion meat -- the breast or chest meat, the shoulders, the ribs, and the backstrap. Each of these is prepared differently. The breast meat, for example, is very soft, so people generally prefer to oven roast it or use it for a stew. Breast meat from a lactating female sea lion is reported to be a rare delicacy in Lower Cook Inlet and Prince William Sound communities. Sea lion shoulder meat is ground up and eaten like hamburger or made into meat balls by adding bread, egg, salt, and pepper. In Unalaska, sea lion soup is made from a piece of meat boiled with petruskies (wild parsley), rice, onion, and potatoes, thickened with flour and water paste.

In the Pribilof Islands many people make pot pies out of sea lion meat. In both Unalaska and the Pribilofs ground sea lion meat is mixed with onions, egg, carrots, and tomato sauce to create *koxllikaq*. One enthusiastic woman in St. George who is noted for her gourmet cooking instructed us in the culinary arts:

> The shoulder you use for steaks or burgers or *isilaw*. *Maw* is made by cutting the meat into small bite-sized pieces and pan frying it until it's almost charcoal. You add a little bit of water to it until it starts sizzling and brown it with salt and pepper and butter. And then your Lea & Perrin sauce. Oh, you fry it and keep turning it over, and oh God! [laughs] I wish I could cook for you guys so you could try it!

This same woman cooks her sea lion ribs in a big pan, seasoned with salt and pepper and other spices, and then roasts them uncovered in the oven.

Occasionally people salt, dry, or smoke their sea lion meat to preserve it, but these methods have largely been replaced by freezing because of the wide availability of home freezers. Sea lion meat is rarely salted. In Perryville, sea lion meat is aged for a week or so before salting. In the Pribilofs several families are fond of sea lion jerky. One woman marinates the meat in soy sauce, Worcestershire sauce, and pepper, then dries it in the warm furnace room of her

house or in her oven on low heat for two or three days. The jerky is eaten by dipping it into seal or sea lion oil.

Sea Lion Oil

On Kodiak Island, sea lion fat taken from the shoulders and back of the animal is fried until it becomes liquid, jarred, and refrigerated or frozen. The reddish-colored oil is called *Userkiq.* After the oil has thawed, many people dip their dry fish in it. Others pour the oil over boiled fish or potatoes, or use it to make *pahinaq,* a mixture of berries, salmon eggs, seal or sea lion oil, and mashed potatoes. One man in Old Harbor says emphatically, "You can't eat sea lion meat without some fat to go with it. If somebody gives you meat with no fat, you get mad."

In other communities, sea lion fat is rendered by cutting it into strips and storing it in jars in cool places where the oil liquifies slowly. Sea lion oil is said to keep longer than harbor seal oil. Like harbor seals, sea lions build up their fat layers during the winter months. They are eagerly sought for their high fat content in late winter. In Ouzinkie sea lion fat is said to be good for a woman's complexion and was used as a cosmetic in the past.

In the Aleutian Islands. some people allow the sea lion fat to ferment and then add it to a pot of fish to make "stink soup." People in Togiak say that cooked sea lion blubber resembles cooked brown bear fat and have found it a convenient substitute for bear fat.

Sea Lion Flippers

Sea lion flippers, both the front flippers and the tail flippers, are considered by some the most desirable parts for eating. Flippers contain a lot of gelatinous cartilage and are sometimes boiled with spices, peeled, deboned, and jarred in

vinegar. Eaten this way, they are frequently compared to pickled pig's feet.

In Southeast Alaska, where only a few families currently use sea lion, flippers were mentioned by some as food items. The flippers are put into an open fire until the skin and hair are burned. Next, the flippers are put into a gunny sack and allowed to soak in salt water overnight. Then the skin is peeled off with a knife, and the flippers are boiled. After cooling, they are cut up and mixed with spices and vinegar. In Lower Cook Inlet sea lion flippers are singed with a torch, then cut into two inch pieces and dropped in boiling water with salt to taste. Then they are brought to boil a second time and simmered until tender, at which time they are served with rice or boiled potatoes, or sewed cold with home-made bread for breakfast.

In the Pribilof and Aleutian Islands people like to make *studen* (a dish apparently introduced by the Russians during the 19th century and called "Aleut jello" by some people). To make *studen* the flippers are boiled, peeled, deboned, and ground up with celery or celery seed, onions, salt, and pepper, and served with tea and buttered bread. There are numerous variations to this. One woman in St. Paul makes her *studen* with carrots, celery, dill pickles, sweet pickles, hard boiled eggs, and dill pickle juice. *Studen* can be made from sea lion or fur seal flippers.

A third Aleut method of preparing sea lion flippers is to ferment them outdoors for three or four months, after which time the skin is peeled off to reveal a delicacy called *alimax*. In Perryville, sea lion flippers are only aged for a week or so before cooking.

Sea Lion Internal Organs

One of the favorite foods of the Alutiiq people in the Kodiak, Prince William Sound, Lower Cook Inlet, and south Alaska Peninsula areas is *kolukuyaq* or *qiluryat,* which is braided sea lion or harbor seal intestines. To prepare this dish, the

intestines are flushed out and rinsed, and then braided with long strips of fat (*uquq*) and meat. The finished *kolukuyaq* resembles a thick piece of rope that is dropped into a big pot and boiled before being sliced and eaten. The braiding is a special skill possessed by only a few elders.

Another internal organ that is greatly relished is pan fried sea lion liver, which is very mild. Some people also eat the sea lion heart which, like the liver, is dipped in flour and pan fried. On Kodiak Island, sea lion kidneys are often prepared by poking a hole in them and stuffing a piece of fat inside the hole before boiling. No reports were received of subsistence hunters or their families eating the lungs of sea lions.

Other Uses of Steller Sea Lions

Historically, sea lion skins had several important utilitarian purposes, especially in the Aleutian Islands. Sea lion hides were stretched and sewn to cover the frames of sea-going kayaks and baidars. Sea lion stomachs were dried, inflated, and made into pokes that held fish and dry meat. Because skin boats are no longer used in this part of Alaska, sea lion hides are rarely used currently. The skins are thick, tough, and difficult to use without splitting. The process of scraping, drying, and splitting is extremely labor intensive and time consuming. Sea lion hides are commonly scarred and damaged by constant abrasion against the rocks where the animals haul out. Many sea lions also develop "target lesions," which are spots on the chest and stomach where the hair gets rubbed off and where a tough fungus grows. Such imperfections make many sea lion hides unsuitable for handicrafts.

Today, most of the non-food uses of sea lions lean towards the artistic and decorative. We met one woman in Unalaska who was making a traditional gut rain parka out of dried sea lion intestines, although this is no longer a common practice.

Artists reviving the manufacture of traditional Aleut bentwood hunting hats continue to use sea lion whiskers for decoration. Some Tlingit decorate ceremonial dance hats with sea lion whiskers.

Two women on the island of St. George use sea lion throat sinews to weave small baskets which they sell to tourists. Men in St. George and Atka are noted for making miniature kayaks covered with sea lion throat membranes. One man we interviewed in Akutan said he does artistic coloring of sea lion back bones, which he makes into butterflies and decorates with hand-painted glass balls, Wherever Steller sea lions are taken for subsistence there seems to be at least one person in each community interested in maintaining or reviving traditional Alaska Native arts using sea mammal products.

SPECIES IDENTIFICATION IN BRISTOL BAY

During the study, identification of seal species proved to be an issue in portions of Bristol Bay. According to the literature, the seasonal geographic range of harbor seal *(Phoca vitulina)* may extend as far north as Etolin Strait and Nunivak Island, while the seasonal geographic range of spotted seal *(Phoca largha)* extends as far south as Bristol Bay (see Fig. 3). At the beginning of this study, we recognized that there would be a methodological problem of species identification of harbor seal and spotted seal in the area of overlap. How to determine if a seal harvested in this area is a spotted seal or a harbor seal was an issue.

As recently as the 1970s, many biologists considered spotted seal to be a subspecies of harbor seal, and the western Alaska seal population was considered to exhibit continuous clinal variations in morphology and behavioral patterns, with hybridization occasionally observed. More recent Linnaean taxonomies now place spotted seal into its own species group *(Phoca largha)*, distinct from harbor seal *(Phoca vitulina)*. Morphologically, the two seal species so closely resemble one another, particularly spotted seals and individual harbor seals in the light color phase, that they are difficult to distinguish except through cranial metrics (Lloyd Lowry, personal communication).

According to the literature (cf. Hoover 1988; Quakenbush 1988), the two species differ in habitat requirements and degree of seasonal mobility. Spotted seals are dependent on the broken sea ice and floes for pupping, and to a lesser extent, for molting, while harbor seals are more dependent on land haulouts (reefs, sand and gravel beaches, and sand and mud bars) for pupping and molting. Spotted seal populations also display distinct seasonal movements from north to south with the advance of the sea ice edge in fall in Bering Strait, and from south to north with

the retreat of the ice edge in spring. Local harbor seal populations are thought to display much less seasonal movement.

Within the study area, seasonal overlap of the two species occurs in Bristol Bay, which is the southern extent of the pack ice movement. Many spotted seals move into Bristol Bay with the ice in late fall (October-December) and out of Bristol Bay with the retreating ice in spring (March-May) (Hoover 1988). Portions of the spotted seal population may remain along the ice-free coasts of Bristol Bay as the sea ice retreats; however, the extent of this is not stated in the literature.

Major harbor seal concentrations occur in several estuarine bays in the southern parts of Bristol Bay during summer, including Port Moller, Seal Islands (north Alaska Peninsula), Port Heiden, Cinder River, and Egegik Bay (Hoover 1988; Frost, Lowry, and Burns 1982). Harbor seals apparently move north along the coast of Bristol Bay as the seasonal ice disappears. There are no geographic barriers to such movement, and it may follow the northward summer migrations of herring, salmon, and smelt. Harbor seal apparently move south along the coast of Bristol Bay in fall as the pack ice advances and coastal ice forms in estuarine bays. However, there is little in the scientific literature documenting the extent of such seasonal movements (cf. Frost, Lowry, and Burns 1982).

These morphological and ecological factors make identification of seal kills from reports of Alaska Native hunters problematic in Bristol Bay. As indicated above, somewhat more than 650 harbor or spotted seals were taken in Bristol Bay in 1992. During the project, questions were asked of key respondents about seal taxonomy and ecology in the Bristol Bay area to provide additional information on how to classify the take. We made decisions on methods for categorizing individual kills in the Bristol Bay area based on the following findings,

During interviews in Bristol Bay communities, the English terms, “spotted seals” and “harbor seals”, were found to be known to most hunters. However, we

assessed that the terms were not used in any consistent fashion between hunters during discourse in English. Hunters were found to refer to harvests sometimes as spotted seals, sometimes as harbor seals, and sometimes interchangeably as spotted or harbor seals. During harvest surveys, English-speaking hunters had to be asked about both harbor and spotted seals for us to ensure against missing seal kills. English terms used by hunters in Bristol Bay were not used by us to assign killed seals to either the harbor seal or spotted seal categories.

For hunters who used Yup'ik terminology, we found the most precise way to enumerate seal kills was to use Yup'ik terms. A relatively precise Yup'ik taxonomy for classifying seals was found to be used by Yup'ik speakers in north Bristol Bay, illustrated in Fig. 7, which is the system provided by marine mammal experts at Togiak and Manokotak.

Elders in Togiak and Manokotak explained the taxonomic differences between Yup'ik terms during interviews conducted by Molly Chythlook, a bilingual researcher. In the Yup'ik taxonomy in north Bristol Bay, *issuriq* is a general term for seal, of which there are three adult types -- *maklak, nayiq,* and *issuriq.* (Note that in the Yup'ik taxonomy in north Bristol Bay, *issuriq* is used at two taxonomic levels of contrast -- as the term for seals in general, and as a specific species of adult seal.) The Yup'ik taxonomy differentiates some types of seals by age. The *maklaaq* is a baby and the *maklassuk* is an adolescent (two-year old), which grow into the *maklak. Maklaaq, maklassuk,* and *maklak* are bearded seals (*Erignathus barbatus*) in the English and Linnaean taxonomies. The *nayiq* is the ringed seal (*Phoca hispida*) in the English and Linnaean taxonomies.

Like some earlier Linnaean classifications, the Yup'ik taxonomy in north Bristol Bay appears to treat adult spotted seal and adult harbor seal as a single taxonomic category, called *issuriq.* The *useqnak* is an adolescent (two-year old) seal that grows into an *issuriq.* The *ul'utvak* ("white coat") is a baby pup born on

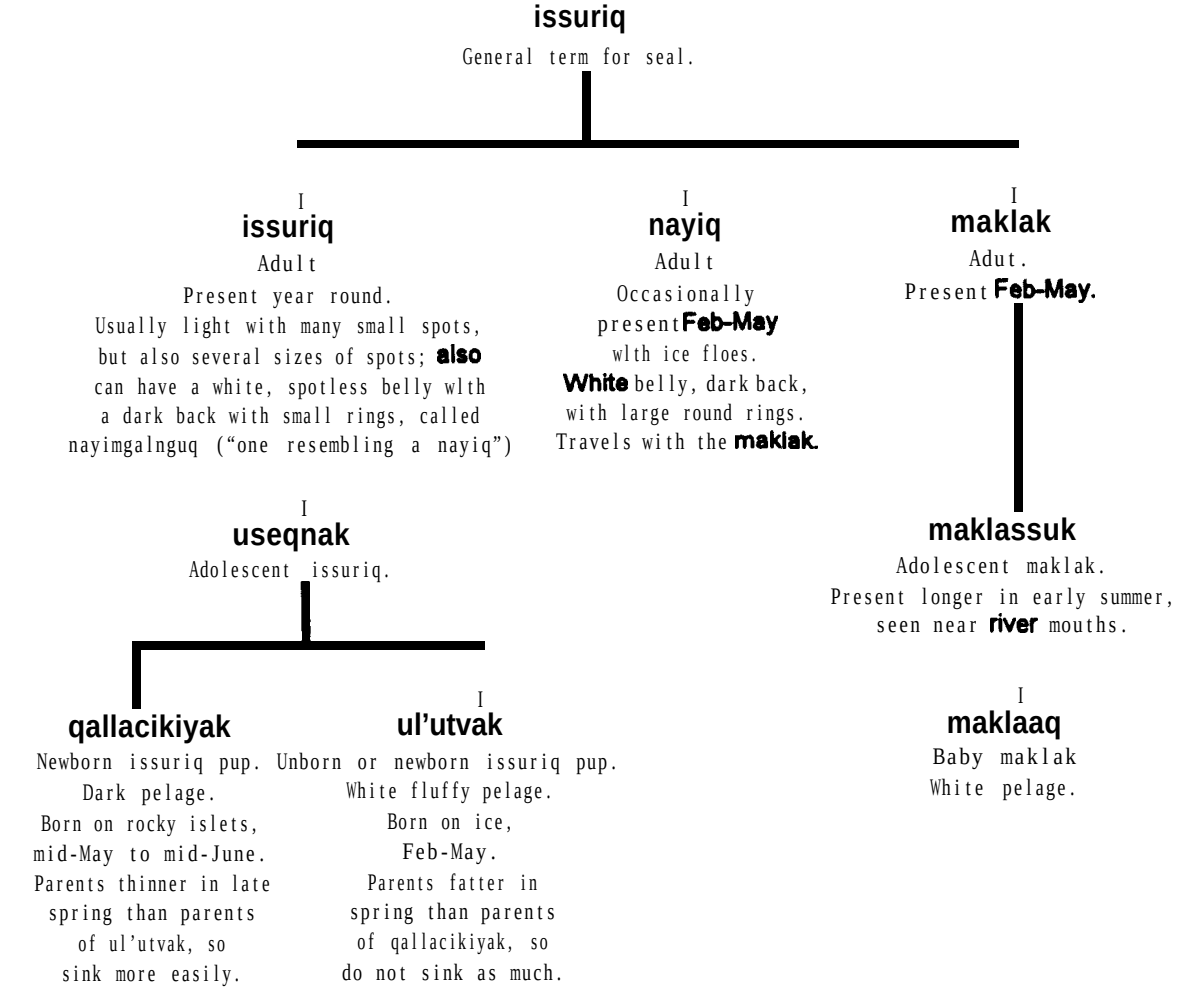
ice from February to May, with white fluffy pelage, which grows into an *useqnak* and *issuriq.* The *qallacikiyak* ("one with umbilicus") is a baby pup born on rocky islets from about mid-May to mid-June, usually with a dark pelage, which grows into an *useqnak* and *jssuriq.* The word *qallacikiyak* refers to the dragging of the umbilicus along the ground (*qallaciq,* "navel, belly button"). The parents of the *qallacikiyak* are thinner and so sink more easily than the parents of the *ul'utvak,* as *issuriq* in general become thinner as the spring and summer progresses.

The ecological knowledge underlying the Yup'ik classification sheds light on the classification issue in north Bristol Bay. The *ul'utvak* may correspond with pups of *Phoca largha* in the current Linnaean system. The *qallacikiyak* may correspond with pups of *Phoca vitulina*. That both types are said to regularly occur at particular times of the year is strong evidence that both *Phoca largha* and *Phoca vitulina* are seasonal breeders in north Bristol Bay. Expert hunters identified common pupping areas for *ul'utvak* on ice and *qallacikiyak* on land, and the times of the year pupping occurred.

Based on reports from hunters, the most important seasonal seal hunting period is associated with shifting pack and shore ice during spring (March, April, and May) for communities north of Kvichak Bay (Aleknagik, Clark's Point, Dillingham, Manokotak, and Togiak) *(see* Fig *8). Issuriq* are hunted among ice leads during the peak spring hunting period. These seals have white-colored pups on the ice in early spring, and a portion reportedly moves out of the area with the retreating ice in May. These characteristics of the *issuriq taken* in association with ice are suggestive of *Phoca largha.*

Hunters also report that *issuriq* are available year round in northern Bristol Bay, even after the ice leaves. For the population associated with warmer ice-free waters north of Kvichak Bay, at least some pup on a number of rocky haulouts identified by respondents in late spring, a feature suggestive of *Phoca vitulina*.

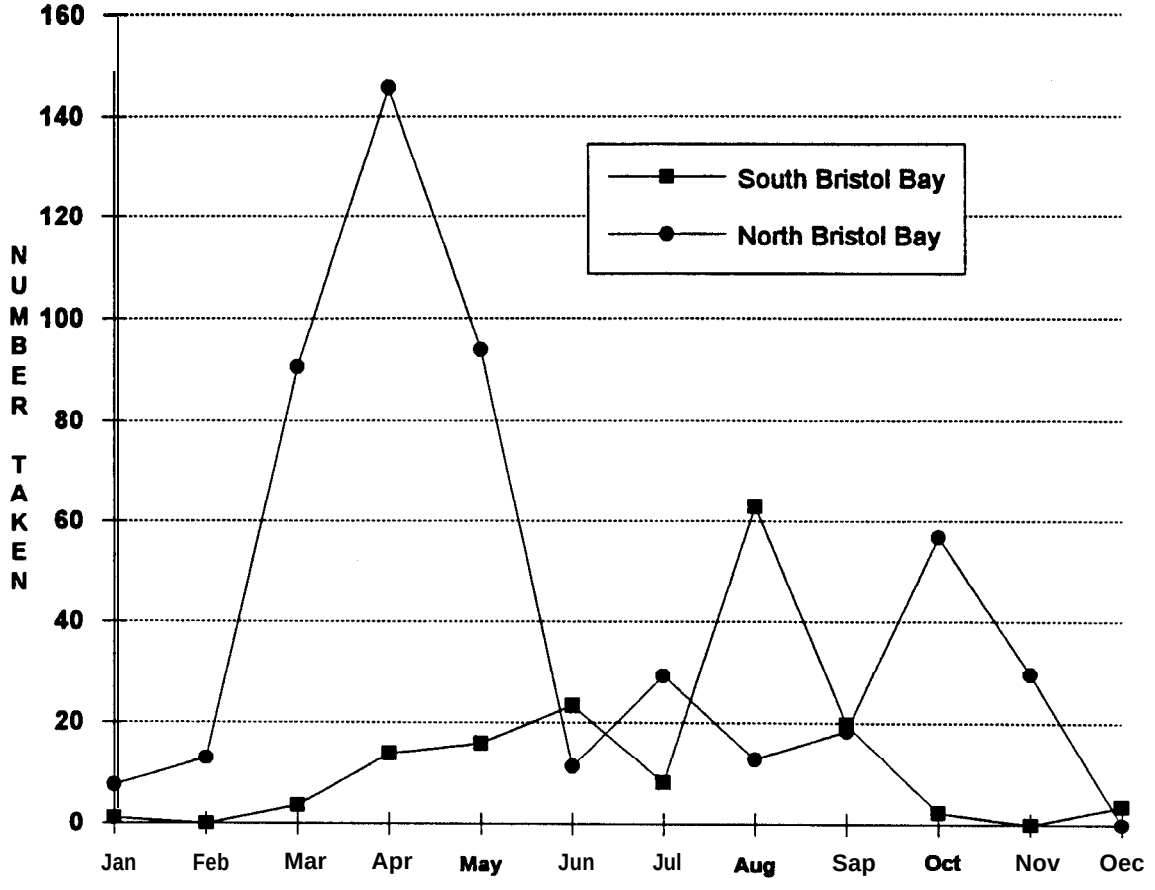
Yup'ik Seal Taxonomy For Issuriq, Togiak and Manokotak, North Bristol Bay



Source: Marine mammal experts in Togiak and Manokotak, Molly Chythlook, interviewer and transcriber

Fig. 7. Yup'ik Seal Taxonomy for Issuriq, Togiak and Manokotak, North Bristol Bay

FIG. 8
SEASONAL TAKE OF ISSURIQ
(HARBOR SEAL AND/OR SPOTTED SEAL)
IN SOUTH AND NORTH BRISTOL BAY, 1992



Harbor and Spotted Seal Takes

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
South Bristol Bay	1	0	4	14		23	8	63		2	0	4
Percent	0.7%	0.0%	2.3%	8.9%	10.2%	15.1%	5.3%	40.8%	12.8%	1.5%	0.0%	2.3%
Cum. Percent	0.7%	0.7%	3.0%	12.0%	22.2%	37.4%	42.7%	83.5%	96.2%	97.7%	97.7%	100.0%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	N o v	Dec
North Bristol Bay	8	13	91	146	94	11	29	13	18	57	30	0
Percent	1.5%	2.5%	17.8%	28.0%	18.5%	2.2%	5.7%	2.5%	3.6%	11.1%	5.8%	0.0%
Cum. Percent	1.5%	4.0%	21.9%	50.5%	69.0%	71.2%	76.9%	79.4%	83.1%	94.2%	100.0%	100.0%

However, there are few other features which suggest that adults taken during the ice-free period should definitely be classified as either *Phoca largha* or *Phoca vitulina*. Just because there is pupping on land by some seals does not mean that all the seals taken north of Kvichak Bay during the warmer, ice-free period are *Phoca vitulina,* as there may be some individuals of *Phoca largha* that do not travel north with the ice in spring and remain in the area year-round. Similarly, there may be *Phoca vitulina* among the leads in the ice in this area during fall, winter, and spring.

In contrast with the major spring hunting pattern north of Kvichak Bay, the seasonal hunting pattern for communities south of Kvichak Bay is more likely to occur during ice-free periods (June through September), with peaks during August (Fig. 8). Some spring hunting among ice floes is reported by Naknek area hunters. With this exception, there were no pronounced spring seal hunting periods associated with ice in Bristol Bay communities south of Kvichak Bay in 1992 (see Appendix C). The harvested seals appear to be primarily associated with warmer waters free of seasonal ice.

Hunters also reported the movement of seals from southwest to northeast as the herring and early runs of salmon moved north in late spring. These seals stayed during summer with various movements depending upon the locality, some moving up into fresh water streams and lakes to feed. The seals reportedly moved southwest when the ice appeared, following the cod according to particular respondents. These movements are suggestive of *Phoca vitulina*.

It was because of the above information that we split Bristol Bay into two regions for data analysis: South Bristol Bay contained communities south of Kvichak Bay, which displayed primarily a summer seal hunting pattern; North Bristol Bay contained communities north of Kvichak Bay, which displayed major spring hunting patterns with more occasional hunting during other periods (Fig. 8).In North Bristol

Bay, we classified the subsistence harvests associated with ice (January through May and October through December) as *Phoca largha,* assuming most seals associated with ice in this area were of this species, and we classified harvests associated with warmer, ice-free waters (June through September) as *Phoca vitulina*. In South Bristol Bay, the harvested seals appear to be primarily associated with warm waters free of the seasonal ice pack. In this region, we classified all seals taken as *Phoca vitulina (see* Fig. 11), assuming that preference for warm waters free of seasonal ice is a feature of this species.

Assessing the number of misclassifications due to these assumptions is difficult without additional information. Because seal harvest levels are low from June through September in North Bristol Bay (about 72 seals in 1992), the absolute number of misclassified seals will be relatively small for this period if the assumptions are incorrect. Seal harvest levels are greater from October through May (about 437 seals in 1992), so if the assumptions are not correct, the number of misclassified seals may be greater for that period. Some portion of the 154 seals taken in South Bristol Bay in 1992 also may be misclassified, particularly if hunters are taking *Phoca largha* during periods of ice in this region.

One relatively unproductive line of inquiry concerning taxonomy involved the color of seals. During interviews, we explored color as a feature to help identify seal kills. Color terminology, except in the instance of pups, was found to be unhelpful in classifying kills in the Bristol Bay area. We found that most hunters could not recall the skin shades and spot patterns of seals taken the year before. Unlike the seal's age, sex, and time of harvest, coloration of adult seals was not an important feature remembered by most hunters. Color terms such as "light coats" and "dark coats" (in reference to the light color of *Phoca largha* and the color phases of *Phoca vitulina* mentioned in the literature) also proved confusing to hunters. Hunters asked to be shown examples of each so as to make intelligent

responses. Procuring examples of skins did not clarify the color question because of the substantial range of variation in shades, patterns, and mottling between individual seals in the Bristol Bay region. The "light" and "dark" categories proved to be artificial bifurcations. In the Yup'ik system, *issuriq* are recognized to come in several color and pattern configurations, from individuals with very light backgrounds and lots of small spots (the most common variety), to individuals with darker backs and fewer, larger spots or small rings (some resembling the *nayiq,* or ringed seal), to individuals with shades in between.

DISCUSSION

The estimates of the subsistence takes of sea lion and harbor seal in 1992 represent a single-year's period. One limitation of single-year hunter surveys is that they cannot provide information on the ranges or trends of harvests over time. Subsistence harvests tend to be dynamic, changing over time due to a number of ecological, economic, and cultural factors. For some subsistence species, there is substantial variability in harvests (often by a factor of two or more) from one year to the next due to normal yearly variations in species availability in a community's geographic use area (cf. Burch 1985; Walker et al. 1989; Wolfe, Paige, and Scott 1990). There also is variability in subsistence harvests for particular species over time due to longer term trends in resource population sizes and cultural practices.

It is difficult to compare the subsistence takes in 1992 with other years without time series data, which at present exist for only a few communities. Nevertheless, there are several reasons to suspect that the total, statewide subsistence takes of harbor seal and seal lion were lower in 1992 compared with subsistence takes during the recent past. The factors leading to this assessment are discussed below.

During interviews, researchers discovered that hunters in certain regions held the mistaken belief that sea lions had been recently closed to subsistence hunting. This belief was prevalent among hunters of Kodiak Island, the Alaska Peninsula, and Bristol Bay. According to respondents, the closure of sea lions to hunting had been publicized in a poster distributed among the communities in 1991 by state and federal agencies. We were able to locate the poster, and found that it featured pictures of a sea lion and a gill net boat, along with the following announcement:

Warning:

Shooting Sea Lions May Be Hazardous
to Your Industry
In 1990 Steller Sea Lions were designated as a
threatened species. If you shoot a sea lion, you could:

- Lose your boat
- Be fined $25,000
- Spend a year in jail

Alaska Department of Fish and Game
National Marine Fisheries Service

According to ADF&G Public Communications Section, the posters were intended to publicize that the direct taking of sea lions as nuisance animals by commercial fishers was illegal. The posters did not mention that subsistence hunting by Alaska Natives was legal.

It appears that the subsistence hunting effort for sea lion may have been reduced in some areas in 1992 compared with other years because of the public information materials. During interviews, some hunters reported no harvests of sea lions because they thought hunting was closed. Researchers clarified the subsistence hunting regulations for hunters, who often expressed surprise to hear that hunting by Alaska Natives was still open. Several respondents stated that they likely would resume the subsistence hunting of sea lions, now that they understood that it was legal.

The total statewide takes of sea lions and harbor seals may have been reduced in 1992 compared with other years because of a second set of factors: the continuing effects of the 1989 *Exxon Valdez* Oil Spill in Prince William Sound. Overall per capita subsistence harvests declined markedly following the oil spill in several Alutiiq communities, including Tatitlek, Chenega Bay, Port Graham, Nanwalek, Ahkiok, Karluk, Larsen Bay, Old Harbor, Port Lions, and Ouzinkie (Fall 1991 a, 1991 b). Fear of contamination of subsistence foods by oil was the most

common reason cited for lower levels of subsistence harvests. While subsistence harvests appear to be recovering in areas affected by the spill, they generally have not returned to pre-spill levels in 1992 (Fall 199 1 a; Fall and Utermohle 1993:604).

A final set of factors that may influence the subsistence takes in 1992 are the general trends in the population sizes of sea lions and harbor seals. Both species have been declining in portions of their ranges in Alaska over the past decade, from the Gulf of Alaska westward. Populations of sea lion and harbor seal appear to be relatively stable in the Southeast region. In general, subsistence harvest trends are probably related to population trends: over time, lower populations are associated with lower harvests. However, in particular areas the effects are probably not simple or immediate. Population trends vary by local area, so one may expect that potential effects on subsistence harvest levels also would vary by locality. Information on the local trends in populations of sea lions and harbor seals were collected during the first year of the project from key respondents. The information is sufficiently complex that no simple generalizations can be made in this first year report.

Comoarisons of Annual Subsistence Takes

Subsistence harvest surveys have been conducted by the Division of Subsistence on previous years in a number of the communities covered during this study. Information on harvests of harbor seals and sea lions from these studies are summarized in Tables 13 and 14. It is important to note that the research methodologies of previous studies commonly differed from that of this current study. In previous studies, harvests of sea mammals were collected while documenting a full range of wild resources used by the community the previous year. Household sampling strategies were not designed to target Alaska Native marine mammal hunters. This means, in many cases, less precision can be

TABLE 13
SUBSISTENCE HARVEST AND USE OF HARBOR SEALS
BY REGION AND STUDY COMMUNITY

Source: ADF&G, Division of Subsistence, Community Profile Database, July 1992

Region and Community	Study Year	Percent of Sampled Households				Estimated Community Harvest	Mean Harvest Per Capita
		Harvesting	Using	Giving	Receiving		
Southeast							
Angoon	84	15.8	31.8	13.2	23.7	57	0.09
Angoon	87	32.1	38.0	17.5	21.2	196	0.38
Coffman Cove	87	1.8	8.2	0.0	4.6	2	0.01
Craig	87	7.4	9.4	7.4	3.1	77	0.07
Edna Bay	87	0.0	5.0	0.0	5.0	0	0.00
Gustavus	87	0.0	5.9	0.0	5.9	0	0.00
Haines	87	0.2	5.4	0.0	5.2	1	0.00
Hoonah	85	28.2	53.5			179	0.24
Hoonah	87	28.5	52.3	28.1	43.3	439	0.63
Hydaburg	87	7.5	26.9	6.0	19.4	31	0.08
Hyder	87	3.0	3.0	0.0	0.0	7	0.09
Kake	85	31.4	32.9			176	0.28
Kake	87	29.0	51.2	20.3	28.7	175	0.27
Kasaan	87	7.1	7.1	0.0	0.0	1	0.03
Klawock	84	8.3	13.9	8.3	8.3	33	0.07
Klawock	87	10.8	15.3	8.8	8.8	46	0.08
Klukwan	87	7.8	31.5	5.1	26.4	13	0.10
Metlakatla	87	3.4	3.7	3.1	0.3	15	0.01
Pelican	87	11.2	24.3	6.4	17.1	21	0.09
Port Alexander	87	3.0	14.5	0.0	14.5	3	0.03
Port Protection	87	0.0	4.0	0.0	4.0	0	0.00
Saxman	87	7.5	28.8	3.3	19.3	8	0.02
Sitka	87	1.4	1.4	0.0	0.0	68	0.01
Skagway	87	0.0	0.5	0.0	0.5	0	0.00
Tenakee Springs	84	4.2	12.5	4.2	12.5	4	0.04
Tenakn Springs	87	3.2	9.7	3.2	6.4	8	0.08
Thorne Bay	87	0.0	2.9	0.0	2.9	0	0.00
Whale Pass	87	5.8	11.1	0.0	5.6	1	0.02
Wrangell	87	3.0	4.8	1.5	2.4	220	0.08
Yakutat	84	20.0	50.0	18.0	34.0	72	0.13
Yakutat	87	23.0	53.3	26.7	39.4	217	0.37
North Pacific Rim							
Chenega Bay	84	80.0	93.3	80.0	86.7	186	3.26
Chenega Bay	85	43.8	75.0	37.5	43.8	154	2.52
Chenega Bay	89	18.7	33.3	16.7	33.3	16	0.26
Chenega Bay	90	38.9	83.3	33.3	61.1	57	0.78
Chenega Bay	91	38.9	72.2	38.9	61.1	28	0.35
Cordova	85	1.0	7.3	1.5	6.3	29	0.01
Cordova	91	2.0	5.0	2.0	4.0	23	0.01
Nanwalek	87	27.3	81.8	39.4	75.8	29	0.36
Nanwalek	89	30.3	84.8	48.5	84.8	27	0.17
Nanwalek	90	14.3	74.3	25.7	68.6	9	0.05
Nanwalek	91	17.2	69.0	20.7	62.1	18	0.11
Port Graham	87	22.2	55.8	20.4	44.4	32	0.18
Port Graham	89	18.7	66.8	16.7	64.6	17	0.11
Port Gmham	90	8.5	71.7	19.6	71.7	10	0.08
Port Gmham	91	18.4	75.5	24.5	69.4	30	0.19
Seldovia	82	0.0				0	0.00
Seldovia	91	0.0	8.1	3.0	6.1	0	0.00

TABLE 13 CONTINUED
SUBSISTENCE HARVEST AND USE OF HARBOR SEALS
BY REGION AND STUDY COMMUNITY
Source: ADF&G, Division of Subsistence, Community Profile Database, July 1992

Region and Community	Study Year	Percent of Sampled Households				Eetiited Community Harvest	Mean Harvest Per capita
		Harvesting	Using	Giving	Receiving		
Tatitlek	87	47.4	89.5	83.2	88.4	393	3.17
Tatitlek	88	52.4	95.2	88.7	76.2	473	4.87
Tatitlek	89	31.8	88.4	38.4	72.7	113	1.02
Tatitlek	90	29.4	82.4	41.2	84.7	78	0.82
Tatitlek	91	52.6	84.2	73.7	88.4	114	1.06
Valdez	91	1.0	4.0	1.0	3.0	82	0.02
Kodiik Island							
Akhiok	82	95.2	100.0			89	0.87
Akhiok	88	18.7	25.0	8.3	18.7	8	0.05
Akilii	89	40.0	100.0	50.0	80.0	13	0.23
Chiniak	82	11.8	5.9			18	0.03
Karluk	82	60.0	70.0			88	0.84
Karluk	88	26.3	84.2	15.8	57.9	24	0.22
Karluk	89	21.4	sl.l	21.4	50.0	7	0.09
Karluk	90	11.8	58.8	11.8	52.9	8	0.10
Karluk	91	7.7	39.5	15.4	30.8	1	0.01
Kodiak City	82	1.3	1.3			176	0.02
Kodiak City	91	0.6	1.8	0.0	1.8	38	0.00
LarsenBay	82	28.1	50.0			56	0.31
Larsen Bay	88	8.1	24.3	2.7	21.8	10	0.08
Larsen Bay	89	8.8	29.4	11.8	23.5	28	0.20
Larsen Bay	90	11.4	45.7	11.4	40.0	27	0.18
Larsen Bay	91	13.2	39.5	10.5	31.6	17	0.11
Old Harbor	82	43.4	52.8			158	0.44
Old Harbor	88	36.4	70.5	38.6	59.1	127	0.34
Old Harbor	89	22.9	60.4	22.9	52.1	45	0.18
Old Harbor	91	14.3	59.5	28.6	52.4	48	0.21
Ouzinkie	82	31.3	50.0			98	0.41
Ouzinkie	88	44.1	52.9	23.5	17.6	87	0.34
Ouzinkie	89	22.9	34.3	20.0	17.1	34	0.16
Ouzinkie	90	11.3	30.2	13.2	24.5	28	0.13
Ouzinkie	91	18.8	34.4	25.0	28.1	24	0.12
Port Lions	82	7.3	9.1			13	0.04
Port Liens	88	9.2	10.8	8.2	1.5	28	0.09
Port Liis	89	2.8	11.1	5.6	8.3	2	0.01
South Alaska Peninsula							
Chignik Bay	84	10.5	31.6	21.1	21.1	7	0.08
Chignik Bay	89	11.4	31.4	14.3	20.0	6	0.05
Chignik Bay	91	13.3	33.3	16.7	20.0	6	0.01
ChignikLagoon	84	11.8	11.8	11.8	5.9	4	0.05
Chignik Lagoon	89	0.0	6.7	0.0	6.7	0	0.00
Chignik Lake	84	13.0	85.2	21.7	58.5	5	0.03
ChignikLake	89	23.8	71.4	33.3	61.9	9	0.08
ChignikLake	91	20.8	70.8	29.2	62.5	10	0.08
FalsePass	88	30.0	55.0	30.0	40.0	28	0.38
IvanofBay	84	88.7	83.3	50.0	50.0	10	0.27
IvanofBay	89	42.9	85.7	42.9	71.4	13	0.41
Nelson Legoon	87	7.7	7.7	0.0	0.0	1	0.02
Perryville	84	35.0	90.0	30.0	75.0	16	0.14
Perryville	89	22.2	83.0	25.9	51.9	16	0.14

TABLE 13 CONTINUED
SUBSISTENCE HARVEST AND USE OF HARBOR SEALS
BY REGION AND STUDY COMMUNITY
Source: ADF&G, Division of Subsistence, Community Profile Database, July 1992

Region snd Community	Study Year	Percent of Sampled Households Harvesting	Using	Giving	Receiving	Estimated Community Harvest	Mean Harvest Per Cspits
South Bristol Bay							
Egegik	84	0.0	4.0	0.0	4.0	0	0.00
King Salmon	83	0.0	2.3		2.3	0	0.00
Levelock	88	18.5	29.8	29.8	14.8	18	0.15
Naknek	83	5.8	13.5		7.7	7	0.02
Pilot Point	87	17.8	47.1	11.8	35.3	5	0.08
Port Heiden	87	8.1	32.4	5.4	29.7	3	0.03
South Naknek	83	0.0	14.3		14.3	0	0.00
North Bristol Bsy							
Clark's Point	89	47.1	70.8	58.8	41.2	13	0.23
Dillingham	84	3.9	26.1	5.9	22.9	83	0.03
Manokotak	85	37.0	72.2	37.0	51.9	48	0.15
Lske iiismns and inland Bristol Bay							
Ekwok	87	0.0	41.4	8.9	41.4	0	0.00
Igiugig	83	33.3			0.0	4	0.08
Iliamna	83	10.0			0.0	5	0.04
Koliganek	87	0.0	71.4	11.9	71.4	0	0.00
Newhalen	83	18.2			0.0	14	0.11
New Stuyahok	87	2.5	77.5	15.0	75.0	4	0.01

TABLE 14
SUBSISTENCE HARVEST AND USE OF SEA LIONS
BY REGION AND STUDY COMMUNITY
Source: ADF&G, Division of Subsistence, Community Profile Database, July 1992

Region and Community	Study Year	Percent of Sampled Households				Estimated Community Harvest	Mean Number Per Capita
		Harvesting	Using	Giving	Receiving		
North Pacific Rim							
Chenega Bay	84	46.7	93.3	53.3	88.7	15	0.28
Chenega Bay	85	43.8	75.0	37.5	43.8	27	0.45
Chenega Bay	89	11.1	18.7	11.1	11.1	2	0.03
Chenega Bay	90	5.8	27.8	5.8	27.8	1	0.01
Chenega Bay	91	16.7	72.2	22.2	66.7	6	0.07
Cordova	85	0.5	2.4	1.0	1.9	12	0.01
Cordova	91	0.0	0.0	0.0	0.0	0	0.00
Nanwalek	87	6.1	45.5	15.2	42.4	8	0.05
Nanwalek	89	3.0	48.5	21.2	48.5	2	0.01
Nsnwsbk	90	5.7	54.3	14.3	51.4	2	0.01
Nanwalek	91	0.0	51.7	3.4	51.7	0	0.00
Port Graham	87	1.9	27.8	1.9	25.9	2	0.01
Port Graham	89	2.1	8.3	2.1	8.3	3	0.02
Port Gmham	90	0.0	13.0	2.2	13.0	0	0.00
PortGraham	91	6.1	30.8	8.2	26.5	4	0.02
Seldovia	82	0.0				0	0.00
Seldovia	91	0.0	3.0	1.5	3.0	0	0.00
Tatiilek	87	15.8	52.6	21.1	42.1	21	0.17
Tatiilek	88	33.3	57.1	47.6	38.1	27	0.27
Tatiilek	89	22.7	54.5	27.3	36.4	18	0.16
Tatiilek	90	5.9	47.1	17.8	41.2	2	0.02
Tatiilek	91	21.1	57.9	42.1	52.8	9	0.08
Valdez	91	0.0	0.0	0.0	0.0	0	0.00
Kodiak island							
Akhiok	82	66.7	76.2			54	0.53
Akhiok	86	16.7	25.0	16.7	16.7	8	0.05
Akhiok	89	50.0	70.0	50.0	50.0	9	0.18
Chiniak	82	5.9	0.0			9	0.01
Karluk	82	40.0	70.0			27	0.26
Karluk	86	5.3	15.8	0.0	10.5	7	0.06
Karluk	89	0.0	7.1	0.0	7.1	0	0.00
Karluk	90	0.0	0.0	0.0	0.0	0	0.00
Karluk	91	00	0.0	0.0	0.0	0	0.00
Kodiak City	82	0.6	1.3			80	0.01
Kodiak City	91	0.0	0.0	0.0	0.0	0	0.00
Larsen Bay	82	18.8	21.9			36	0.20
LarsenBay	88	0.0	5.4	0.0	5.4	0	0.00
Larsen Bay	89	2.9	14.7	2.9	11.8	6	0.05
LarsenBay	90	8.6	20.0	8.6	11.4	9	0.08
LarsenBay	91	2.6	5.3	2.6	5.3	1	0.01
Old Harbor	82	48.7	57.9			96	0.27
Old Harbor	86	43.2	79.5	43.2	58.8	173	0.48
Old Harbor	89	12.5	58.3	14.6	54.2	22	0.08
Old Harbor	91	9.5	42.9	26.2	38.1	17	0.08
Ouzinkie	82	9.4	12.5			11	0.05
Ouzinkie	86	8.8	17.6	2.9	11.8	13	0.07
Ouzinkie	89	0.0	2.9	0.0	2.9	0	0.00
Ouzinkie	90	1.9	1.9	1.9	1.9	3	0.01
Ouzinkie	91	0.0	3.1	0.0	3.1	0	0.00
PortLions	82	1.8	0.0			8	0.03
PortLions	86	1.5	1.5	0.0	0.0	3	0.01
PortLions	89	0.0	0.0	0.0	0.0	0	0.00

TABLE 14 CONTINUED
SUBSISTENCE HARVEST AND USE OF SEA LIONS
BY REGION AND STUDY COMMUNITY
Source: ADF&G, Division of Subsistence, Community Profile Database, July 1992

Rsgion snd Community	Study Year	Percent of Sampisd Households				Estimated Community Harvest	Mean Number Per Capita
		Harvesting	Using	Giving	Receiving		
Lower Alaska Peninsula							
Chiinik Bay	84	5.3	5.3	5.3	0.0	1	0.01
Chignik Bay	89	0.0	5.7	0.0	5.7	0	0.00
Chignik Bay	91	0.0	0.0	0.0	0.0	0	0.00
Chignik Lake	84	4.3	8.7	0.0	4.3	1	0.01
Chignik Lake	89	4.8	4.8	4.8	0.0	1	0.01
Chignik Lake	91	0.0	4.2	0.0	4.2	0	0.00
Fabe Pass	88	5.0	5.0	5.0	0.0	1	0.01
Ivanof Bay	84	16.7	18.7	16.7	18.7	2	0.05
Ivanof Say	89	14.3	28.8	14.3	14.3	1	0.03
Perryville	84	20.0	70.0	20.0	55.0	7	0.08
Perryville	89	18.5	37.0	22.2	25.9	11	0.09
North Bristol Bay							
Dillingham	84	0.0	0.7	0.7	0.7	0	0.00
Manokotak	85	20.4	35.2	22.2	20.4	18	0.15

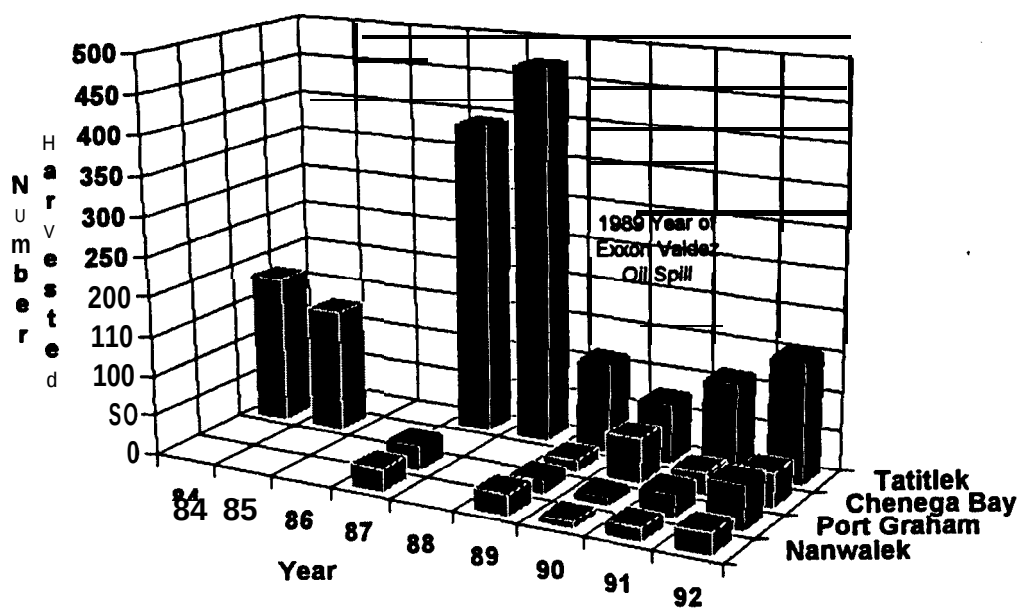
expected in estimates of marine mammal takes due to sampling bias. For small communities where census samples were used, this is less of a problem. No take estimates prior to 1992 include animals which were struck and lost. In comparing the harvest estimates in 1992 with previous years, one must keep in mind that differences observed may be due to these types of methodological differences in the study designs between years.

Only a handful of communities have been surveyed over a number of years for assessments of annual harvest variability or harvest trends. Figures 9-14 depict harvests of harbor seals and sea lions in 12 communities for which the Division of Subsistence has four or more years of data. For these comparisons, animals which were struck and lost were removed from the 1992 estimates to make the harvest numbers more directly comparable across years. The communities are grouped by region.

In the North Pacific Rim region, there appear to be relatively complex changes occurring in the harvests of the four communities (Figs. 9 and 10). In Tatitlek and Chenega Bay, estimated harbor seal harvests were substantially larger prior *to 1989,* the year of the *Exxon Valdez* Oil Spill, than after (Fig. 9). Harbor seal harvests seem to be increasing over the last three years in Tatitlek, though they have not reached pre-spill levels, while harvests in Chenega Bay show no obvious trends in recent years. Similarly, estimated sea lion harvests in 1992 appear to be substantially lower than harvests prior to 1989 in both communities (Fig 10). For Nanwalek and Port Graham, the lowest estimated harbor seal harvests were recorded for 1990, the year after the oil spill, while the estimated harvests in 1992 are as large or larger than any previous study year (Fig. 9). No obvious trends are apparent in sea lion harvest estimates for Nanwalek and Port Graham (Fig. 10).

On Kodiak Island (Figs. 11 and 12), estimated harbor seal harvests in 1992 were lower for five of six communities compared with estimates in 1982. For

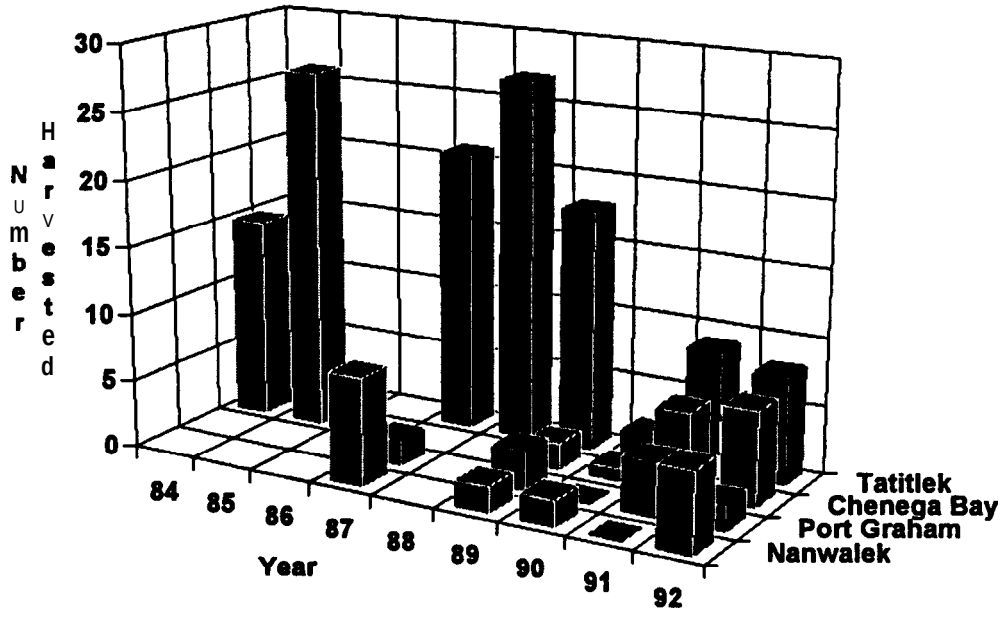
Fig. 9
Change in Harbor Seal Harvests,
North Pacific Rim Communities



HARBOR SEAL HARVESTS

Year	Nanwalek	Port Graham	Chenega Bay	Tatitlek
64			166	
66			154	
66				
67	29	32		393
66				473
69	27	17	16	113
90	9	10	67	76
91	16	30	26	114
92	26	66	43	163

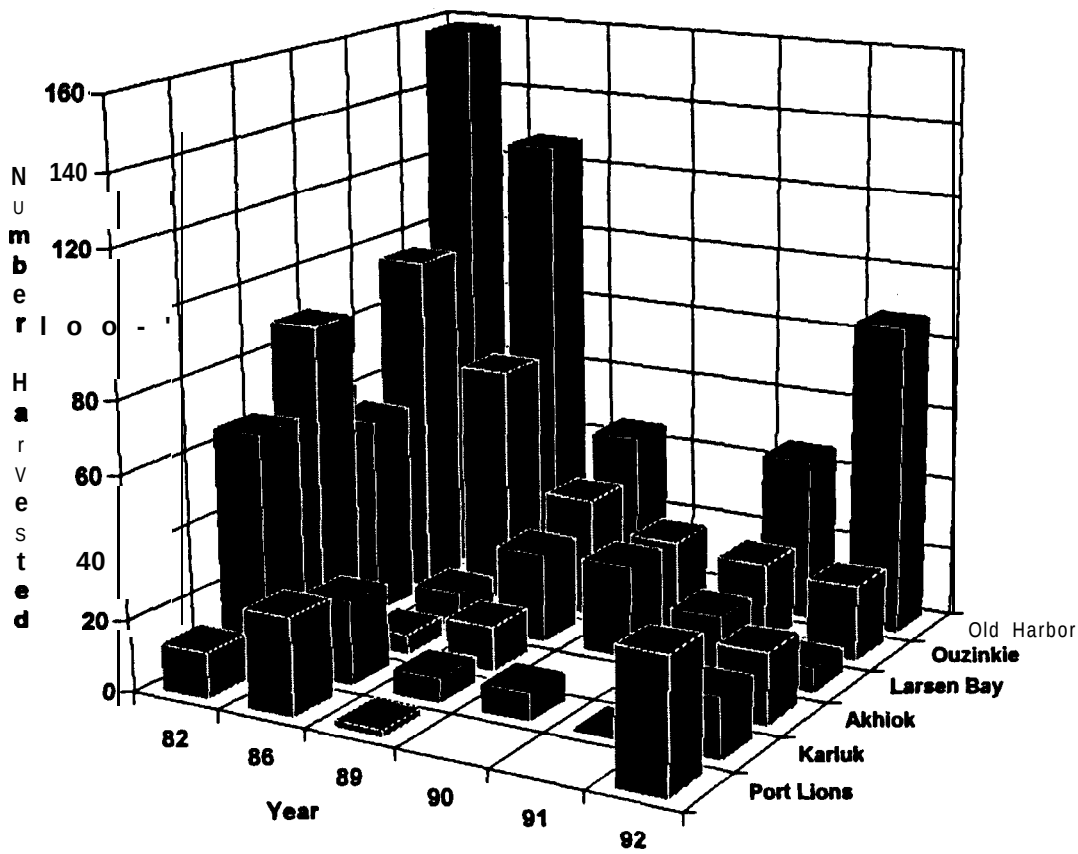
Fig. 10
Change in Sea Lion Harvests,
North Pacific Rim Communities



SEA LION HARVESTS

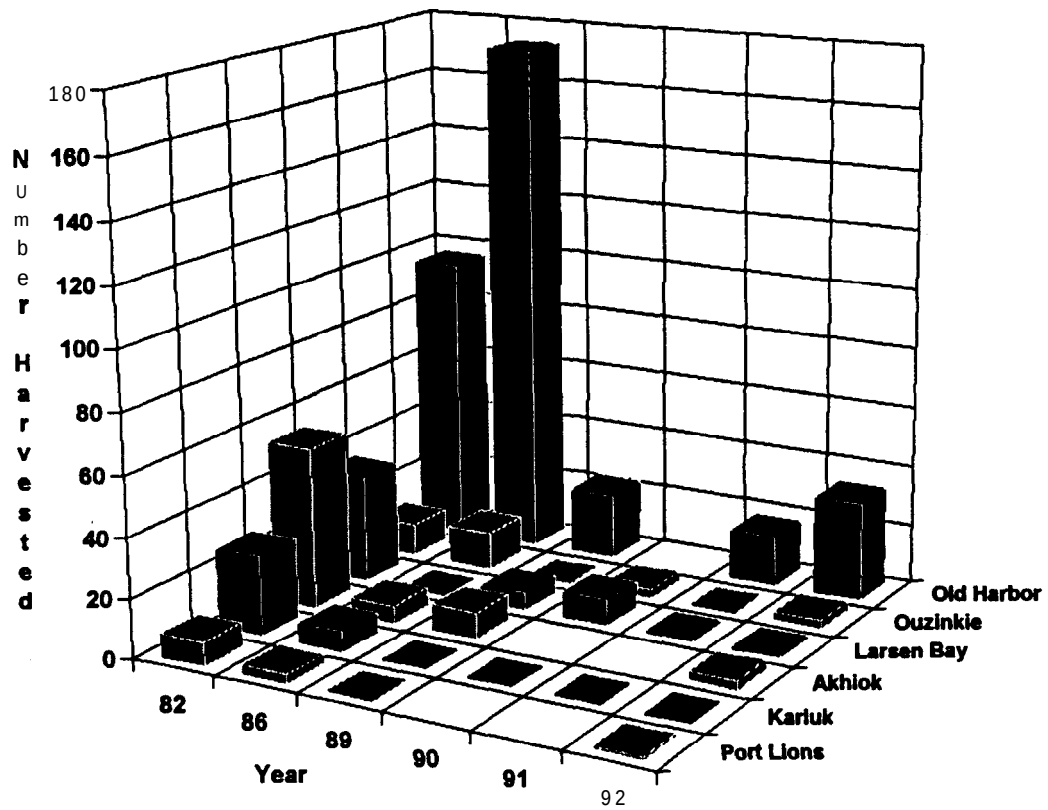
Year	Namvabk	Port Graham	Chenega Bay	Tatitlek
64			15	
66			27	
86				
67	6	2		21
66				27
69	2	3	2	16
90	2	0	1	2
91	0	4	6	0
92	6	2	7	8

Fig. 11
Change in Harbor Seal Harvests,
Kodiak Island Communities



HARBOR SEAL HARVESTS						
	Port Lions	Karluk	Akhbk	Larsen Bay	Ouzinkie	Old Harbor
62	13	66	60	66	96	166
66	26	24	6	10	67	127
89	2	7	13	26	34	46
90		6		27	26	
91		1		17	24	46
92	37	17	20	7	22	67

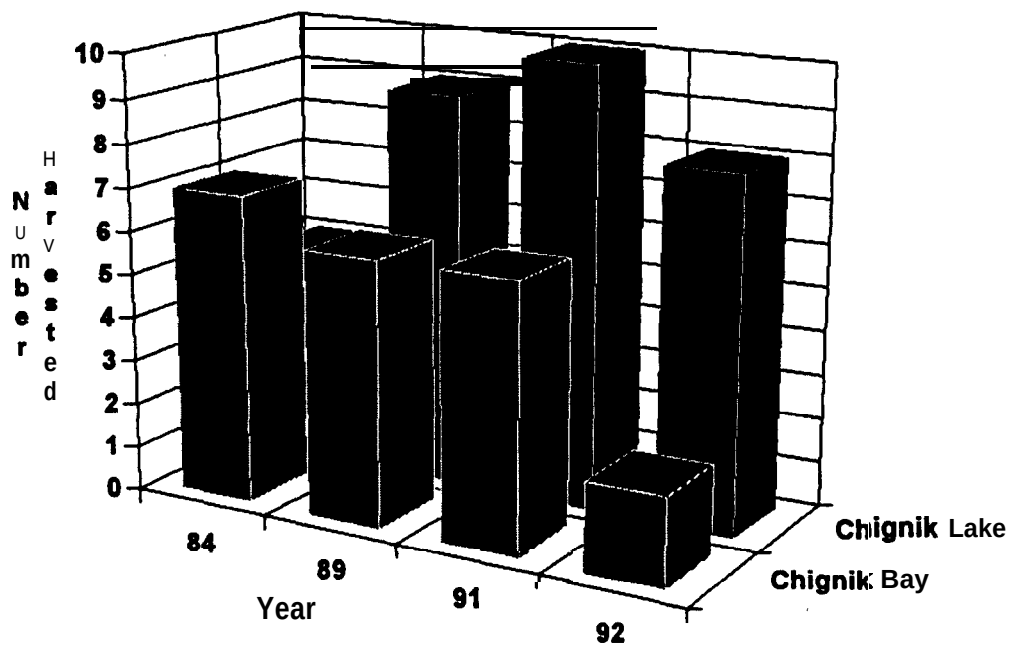
Fig. 12
Change in Sea Lion Harvests,
Kodiak Island Communities



SEA LION HARVESTS

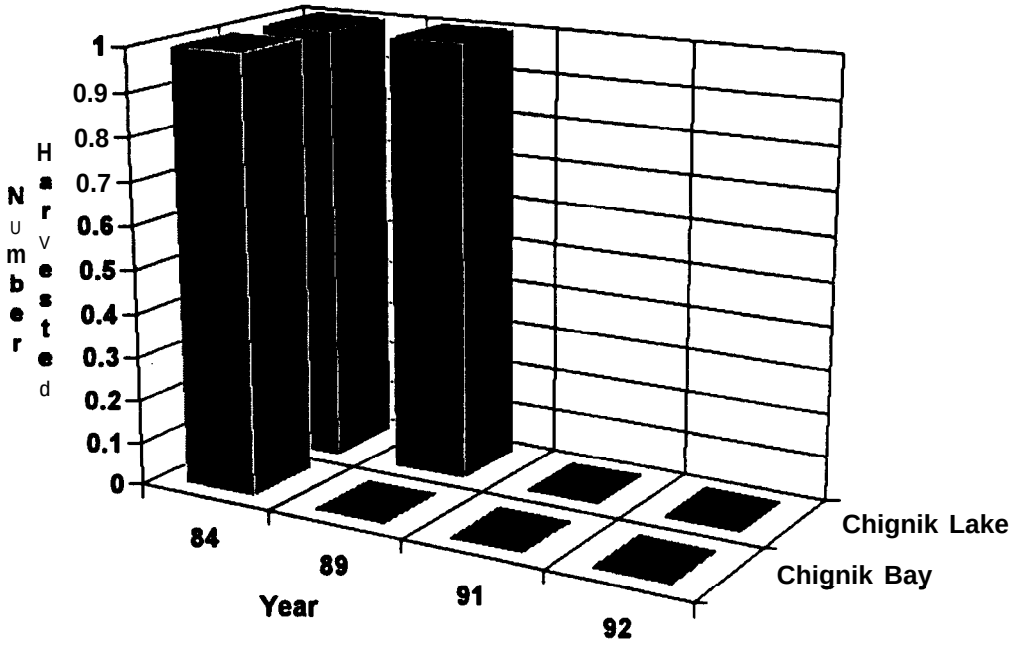
Year	Port Lions	Karluk	Akhbk	Larsen Bay	Ouzinkie	Old Harbor
62	6	27	64	36	11	96
66	3	7	6	0	13	173
69	0	0	9	6	0	22
00		0		9	3	
91		0		1	0	17
92	1	0	3	1	3	33

Fig. 13
Change in Harbor Seal Harvests,
Chignik Bay and Chignik Lake



HARBOR SEAL HARVESTS		
Year	Chignik Bay	Chignik Lal
64	7	5
89	6	9
91	6	10
92	2	6

Fig. 14
Change in Sea Lion Harvests,
Chignik Bay and Chignik Lake



SEA LION HARVESTS

Year	Chignik Bay	Chignik Lake
64	1	1
60	0	1
91	0	0
02	0	0

years with complete information for all six communities, harbor seal harvests were 478 (1982), 262 (1986), 127 (19891, and 190 (1992). This suggests a marked decline in harbor seal harvests on Kodiak Island during the recent decade. However, Ouzinkie is the only community which displays a smooth, declining curve in harbor seal harvests. Harvests in other communities show substantial variability between years (Fig. 11). With sea lions, estimated harvests in 1992 were lower for all six Kodiak Island communities compared with estimates in 1982. Sea lion harvests for years with complete coverage were 232 (19821, 202 (19861, 37 (1989), and 41 (1992). Like harbor seal, this suggests a marked decline in sea lion harvests on Kodiak Island over the last decade (Fig. 12).

For two communities on the South Alaska Peninsula (Chignik Bay and Chignik Lagoon), annual harvests of harbor seals and sea lions show few obvious trends (Fig. 13 and 14). Combined harvests of harbor seal were 12 (19841, 15 (19891, 16 (1991), and 10 (1992); combined harvests of sea lion were 2 (1984), 1 (1989), 0 (1991). and 0 (1992). Harvests of harbor seals and sea lions appear to be relatively low, and display small variations from year to year.

Comparisons With Other Historic Takes

When asked about local trends in the subsistence take of harbor seal, many older hunters commented that current takes are much reduced from the days when a bounty was offered for harbor seals. The history of the bounty program in Alaska is provided in the Addendum to Appendix B. A hair seal bounty program was operated by the territorial or state government from 1927-72. Under this program, hunters were paid from $3 to $6 for each hair seal nose turned over to the government. For most years, the bounty program covered southern Alaska waters, though boundaries shifted somewhat between years (during its last six years, the program operated only in northern areas without harbor seal). In addition to the

bounty program, the Territory operated a separate hair seal predator control program from 1951-59 on the Stikine, Taku, and Copper rivers, where seals were shot or bombed to protect commercial salmon fisheries. An additional monetary incentive for killing hair seals developed during the mid-l 960s, when commercial prices for seal skins made a sharp, but brief rise (from about 82-83 per pelt to $40-$50 per pelt), due to market dynamics in eastern Canada.

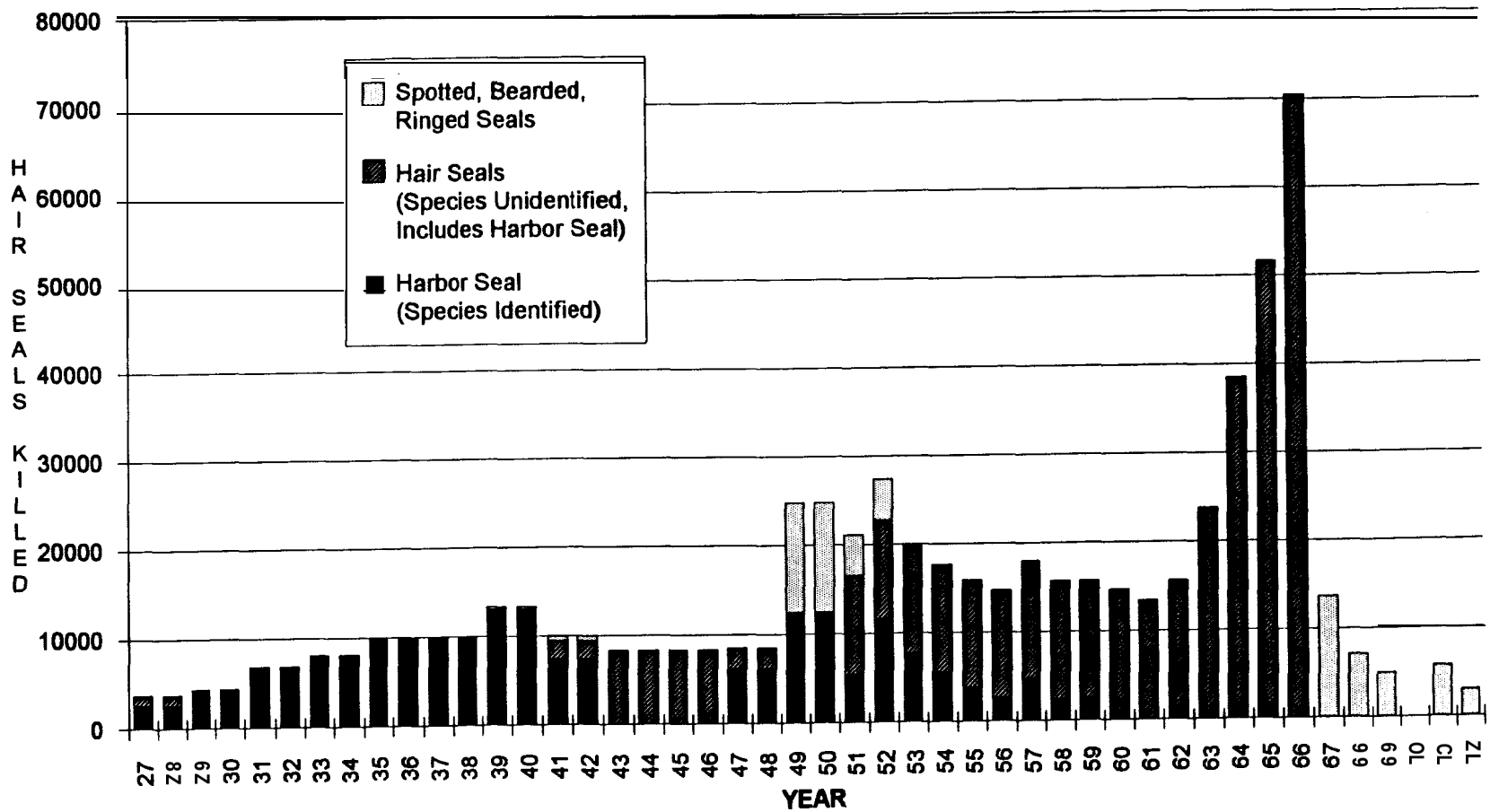
During interviews, older Alaska Native hunters in many communities recalled that more harbor seals were killed in the past by Native and non-Native hunters because of the additional monetary incentives created by the bounty program, predator control program, and commercial seal skin industry. To assess the number of hair seals taken during the bounty period, we attempted to compile historic records from the state archives in Juneau on the bounty system. As described in the addendum, we could not locate precise records of the numbers, species, and locations of hair seals killed during the bounty period for every year. However, the number of harbor seals killed under the bounty and predator control program could be estimated for certain years, based on the geographic origins (Judicial Districts) of the seal noses.

The numbers of hair seals killed by year under the bounty and predator control programs are shown in Fig. 15. Species have been identified where possible. For most years where districts were identified, the majority of bountied hair seals came from southern districts with harbor seals. By extension, for years with unidentified hair seals the majority presumably are harbor seals.

As shown in Fig. 15, during the 1930s and 1940s, the numbers of bountied hair seals fluctuated just short of about 10,000 animals annually. During the 1950s, the numbers of hair seals killed under the bounty and predator control programs ranged between about 15,000 to 20,000 animals annually. Most of these were probably harbor seal. During the 1960s, hair seal kills sharply rose each

Fig. 15

Hair Seals Killed in Alaska, 1927-1972,
Under Bounty and Pedator Control Programs
(Programs Ended After 1972)



Source: Division of Subsistence, Alaska Department of Fish and Game

year to a peak of about 70,000 seals in 1966. As stated above, this sharp rise was primarily driven by a short, rapid increase in the commercial market for seal skins. The monetary incentives for taking harbor seal ended soon after 1966. In 1967, the bounty program was restricted to northern districts only, and apparently the commercial markets for skins collapsed about the same time.

The estimated subsistence take of 2,867 harbor seals by Alaska Natives in 1992 is substantially lower than the seal takes during the years of the bounty program, which conservatively numbered at least 10,000 harbor seals every year from 1949 to 1966. Older hunters commonly referred to the bounty period when asked to place the current subsistence take into an historic context. It was reported by older respondents that populations of seals in certain areas were probably kept lower due to the bounty and predator control programs, but that harbor seal populations were unaffected in other areas. According to respondents, harbor seal populations quickly rebounded once the bounty program ended. Many older respondents stated that they believed the current subsistence takes of harbor seal probably were not affecting population levels, being substantially smaller than historic takes under the bounty program which are reported by hunters to have had minimal effects on overall seal populations.

Research in Year Two

This report covers the first year of a two-year project to document the subsistence takes of harbor seal and sea lion by Alaska Natives. Unlike the first year, where most surveys were conducted by Division of Subsistence personnel, during the second year information on subsistence takes will be collected principally by locally-hired researchers in each community. During the first year, local assistants were trained in most communities to conduct interviews with marine mammal hunters. It is planned that local researchers will conduct the surveys the

second year with additional training.

Training sessions are planned in Anchorage, Dillingham, Juneau, Kodiak City, and Unalaska during the fall of 1993. Local researchers will be brought together at these meetings for additional training in survey design, interview techniques, sample selection, and other research methods. Selection of appropriate household samples will be done at these sessions for each community.

Two survey periods are planned for the second year. The first will occur in late 1993, just prior to the holiday season. The survey will cover marine mammal hunting from January through November 1993. The second survey period is tentatively planned for mid-May 1994, covering the marine mammal hunting period from December through early May. Household surveys will be mailed to the Division of Subsistence for data analysis and reporting.

The effectiveness of this type of research structure is uncertain. There are a variety of difficulties that local researchers may encounter in conducting surveys. It is anticipated that problems will arise in a certain number of communities. In these cases, it is planned that researchers from the Division of Subsistence will provide additional survey support to the project in the community, although Division staffing will be significantly reduced compared to the first year.

We believe the long-term success of subsistence monitoring of harbor seal and sea lion is dependent upon an appropriate organizational structure that directly incorporates marine mammal hunters into the program (Case 1991). In regards to sea lion and harbor seal, there are no existing Alaska Native organizations that have been organized specifically to deal with these two species, or to represent the subsistence users of these two species, as currently exists with beluga (Alaska and Inuvialuit Beluga Whale Committee), walrus (Eskimo Walrus Commission), bowhead whale (Eskimo Whaling Commission), and sea otter (Alaska Sea Otter Commission). The Indigenous People's Council on Marine Mammals is organized to bring together

representatives of these separate groups. There also are a number of local, regional, and state organizations that have an interest in subsistence uses in general, including the local tribal governments, regional Native organizations, Alaska Federation of Natives, and RurAL CAP. At present, it is not clear which of the above organizations, or possibly new organizational structures, might be appropriate entities for involvement in long-term subsistence research on sea lions and harbor seals. During the second year, continued discussions are planned with the Indigenous People's Council for Marine Mammals regarding appropriate organizational structures incorporating subsistence users of sea lions and harbor seals which would improve the success any long-term subsistence harvest program.

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APPENDIX A

SURVEY INSTRUMENT USED IN HOUSEHOLD INTERVIEWS

The Subsistence Harvest of Harbor Seal and Seal Lion by Alaska Natives in 1992, by Robert J. Wolfe, et al, Division of Subsistence, Alaska Department of Fish and Game, Juneau, Alaska, July 1993. Final Report For Year One, Subsistence Study and Monitor System (No. 50ABNF200055), Prepared for the National Marine Fisheries Service.

ARE ANY MEMBERS OF YOUR HOUSEHOLD ALASKA NATIVES?

YES: _____ NO: _____ THANK YOU FOR YOUR COOPERATION.

This survey is only relevant to Native households.

How many people lived in your household in 1992? _____

Were you living in the community six months or more in 1992? Yes: _____ If no, where did you live? _____

HARBOR SEAL

DID MEMBERS OF YOUR HOUSEHOLD TRY TO HARVEST OR USE HARBOR SEALS IN 1992?

_____ **YES, PLEASE COMPLETE THE FOLLOWING QUESTIONS:**

_____ **NO, TURN OVER AND COMPLETE SEA LION SURVEY.**

During 1992, did your household:

	Yes	No
1. Use harbor seals (meat, hides, or oil)?		
2. **Attempt to harvest harbor seals?**		
3. **Harvest (kill) harbor seals?**		
4. Receive harbor seals from other households or communities?		
5. Give away harbor seals to other households or communities?		

IF YES TO QUESTION 2 OR 3 ABOVE, GO TO QUESTION 6. IF NO, TURN OVER AND COMPLETE SEA LION SURVEY.

6. How many harbor seals did your household kill? [Enter in total box.]

7. In which months did you kill them? How many in (January, etc.)? [Enter the numbers by month.]

HARBOR SEAL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	TOTAL
TOTAL														

8. Of the harbor seal you killed in (January, etc.), how many were male or female, and how many were pups, juveniles (young, pre-adults), or adults? [Enter the numbers by month.]

HARBOR SEAL (Detail)		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	TOTAL
ADULT	MALE														
	FEMALE														
	UNKNOWN														
JUVENILE	MALE														
	FEMALE														
	UNKNOWN														
PUP	MALE														
	FEMALE														
	UNKNOWN														
UNKNOWN AGE	MALE														
	FEMALE														
	UNKNOWN														

During the 1992,

9. How many harbor seal were struck and lost by your household? [Enter number in total box.]

10. In which months were they struck and lost? [Enter numbers by month.]

HARBOR SEAL STRUCK AND LOST	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	TOTAL

Community: _____ (____) HH: _____ H R MARINE MAMMAL SURVEY 1992

CONTINUE TO BACK SIDE

INTERVIEWER: _____ DATE: _____

SEA LIONS.

DID MEMBERS OF YOUR HOUSEHOLD TRY TO HARVEST OR USE SEA LIONS IN 1992?

_____ **IF YES, PLEASE COMPLETE THE FOLLOWING QUESTIONS:** _____ **IF NO, Thank you for your cooperation.**

During 1992, did your household:

	Yes	No
1. Use sea lions (meat, hides, or oil)?		
2. **Attempt to harvest sea lions?**		
3. **Harvest (kill) sea lions?**		
4. Receive sea lions from other households or communities?		
5. Give away sea lions to other households or communities?		

IF YES TO QUESTION 2 OR 3 ABOVE, GO TO QUESTION 6. IF NO, THIS COMPLETES THE SURVEY. THANK YOU FOR YOUR COOPERATION.

6. How many sea lions did your household kill? [Enter in total box.]
7. In which months did you kill them? How many in (January, etc.)? [Enter the numbers by month.]

SEA LIONS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	TOTAL
TOTAL														

8. Of the sea lions you killed in (January, etc.), how many were male or female, and how many were pups, juveniles (young, pre-adults), or adults? [Enter the numbers by month.]

SEA LIONS (Detail)		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	TOTAL
ADULT	MALE														
	FEMALE														
	UNKNOWN														
JUVENILE	MALE														
	FEMALE														
	UNKNOWN														
PUP	MALE														
	FEMALE														
	UNKNOWN														
UNKNOWN AGE	MALE														
	FEMALE														
	UNKNOWN														

During the 1992,

9. How many sea lions were struck and lost by your household? [Enter number in total box.]
10. In which months were they struck and lost? [Enter numbers by month.]

SEA LIONS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	UNKNOWN	TOTAL
STRUCK AND LOST														

THANK YOU FOR YOUR COOPERATION.

Alaska Department of Fish Game, Division of Subsistence, 333 Raspberry Rd., Anchorage, AK 99518-1599 **(907) 267-2353**

APPENDIX B

SUBSISTENCE TAKES OF HARBOR SEAL AND SEA LION BY REGION

The Subsistence Harvest of Harbor Seal and Seal Lion by Alaska Natives in 1992, by Robert J. Wolfe, et al, Division of Subsistence, Alaska Department of Fish and Game, Juneau, Alaska, July 1993. Final Report For Year One, Subsistence Study and Monitor System (No. 50ABNF200055), Prepared for the National Marine Fisheries Service.

APPENDIX B
SUBSISTENCE TAKES OF
HARBOR SEAL AND SEA LION
BY REGION

Harbor Seal (Phoca vitulina)

Harbor and Spotted Seal

Spotted Seal (Phoca largha)

Sea Lion (Eumetopias jubatus)

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: SOUTHEAST ALASKA, 1992

SAMPLING DESIGN: Chain Referral and Random of "Hunters" only

	Active	Other	Total
Total Native Households	572	16	588
Surveyed Households	480	14	474
Sampling Fraction	80.4%	87.5%	80.8%
Sample Household Members	1811	53	1884
Estimated Household Members	2242.5	60.4	2302.9

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:	
Used	87.8%
Hunted	55.9%
Harvestad	47.9%
Received	59.5%
Gave Away	88.3%

Estimated Community Harvest and Take (Expanded):	
Total Number Harvested	1,481.3
Total Number Struck and Lost	189.4
Total Number Taken	1,670.7
Number Harvested Per Capita	0.84

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	od	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	85	96	138	72	69	36	64	57	102	139	141	130	63	1191
Struck and Lost	10	6	14	6	10	11	22	16	2	5	14	9	20	149
Total Take	95	104	152	80	79	46	86	73	104	144	155	139	63	1340
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	105.6	117.3	171.5	92.3	88.1	44.9	80.8	70.9	126.3	171.5	173.6	166.9	79.6	1461.3
Struck and Lost	12.3	9.7	17.5	10.0	14.5	14.3	29.1	21 .o	2.4	6.0	t7.3	10.6	24.5	169.4
Total Take	117.9	127.0	169.0	102.2	102.6	59.2	109.9	91.9	150.7	177.5	191.1	167.5	164.1	1670.7
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	112.4	121 1	176.4	97.6	93.9	47.7	66.5	71.7	135.5	162.9	166.5	167.2		1461.3
Struck and Lost	13.3	11.2	16.9	11.1	16.1	16.3	39.3	24.4	2.6	6.4	16.5	11.3		169.4
Total Take	125.6	132.3	195.3	106.6	110.0	84.0	125.6	96.1	136.1	169.4	206.9	170.4		1670.7
Total Take (%)	7.5%	7.9%	11.7%	6.5%	6.6%	3.6%	7.5%	5.8%	6.3%	11.3%	12.4%	10.7%		100%
Cumulative Take	125.6	257.9	453.2	561 .9	672.0	735.9	861.7	957.9	1095.9	1265.3	1492.3	1670.7		
Cum. Take (%)	7.5%	15.4%	27.1%	33.6%	40.2%	44.1%	51.6%	57.3%	65.6%	76.9%	69.3%	100.0%		

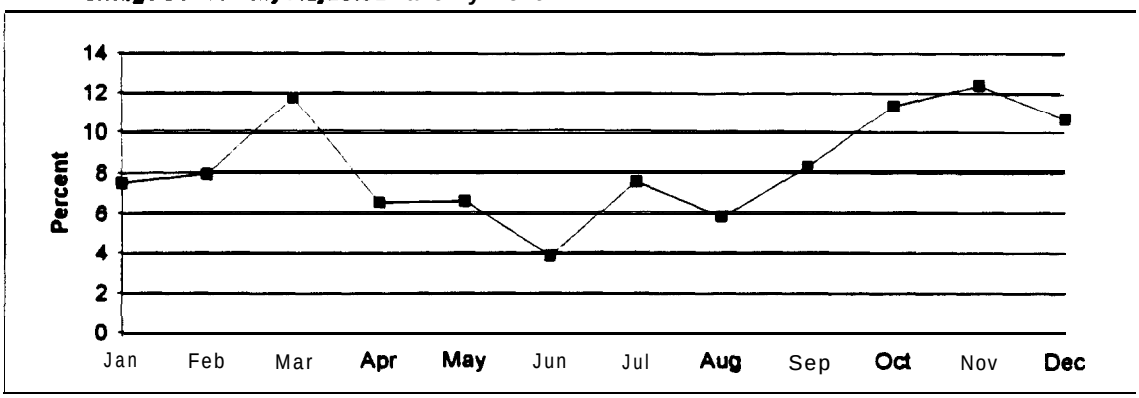
HARBOR SEAL HARVEST BY AGE AND SEX

	Reported By Sample (Unexpended)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	497	41.7%	616.2	41.7%
Adult Female	226	19.0%	285.8	19.3%
Adult Unknown Sex	226	19.1%	279.2	16.9%
Juvenile Male	49	4.1%	60.4	4.1%
Juvenile Female	12	1.0%	15.4	1.0%
Juvenile Unknown Sax	53	4.5%	66.6	4.6%
Pup Male	2	0.2%	2.4	0.2%
Pup Female	1	0.1%	1.1	0.1%
Pup Unknown Sax	3	0.3%	3.9	0.3%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	120	10.1%	146.2	9.9%
Total	1191	100.0%	1461.3	100.0%

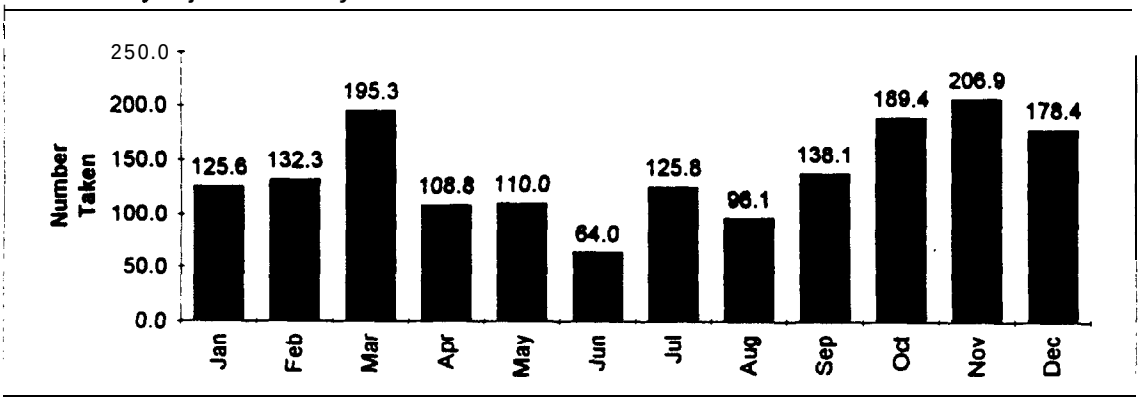
SOURCE: Alaska Department of Fii and Game, Dii of Subsistence, Subsistence Study ... Monitor System ... Sea Lions • nd Harbor Seals i Alaska.

HARBOR SEAL (Phoca vitulinr) TAKE ESTIMATES: SOUTHEAST ALASKA, 1992

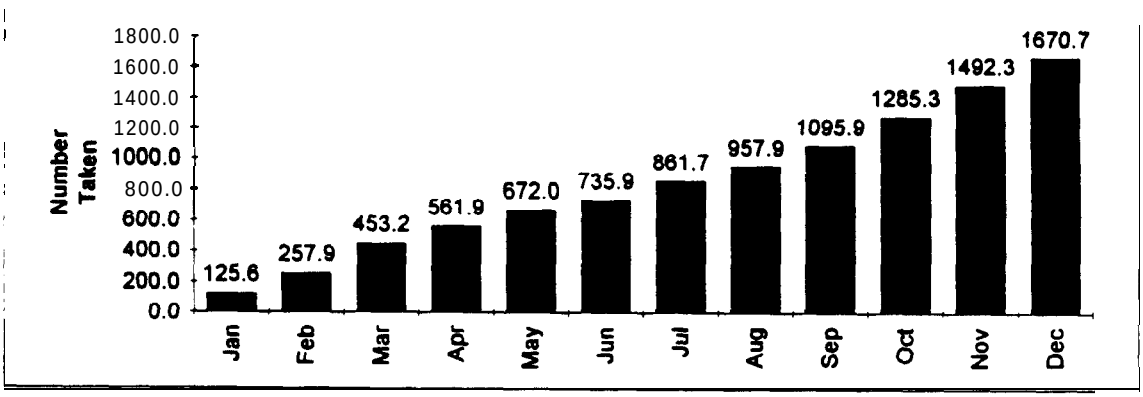
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:02 PM

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HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: NORTH PACIFIC RIM, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	31	624	655
Surveyed Households	28	243	271
Sampling Fraction	90.3%	38.9%	41.4%
Sample Household Members	85	777	862
Estimated Household Members	93.5	1879.9	1973.4

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	52.0%
Hunted	25.5%
Harvested	19.2%
Received	47.6%
Gave Away	26.6%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	397.4
Total Numbar Struck and Lost	33.4
Total Number Taken	430.8
Number Harvested Per Capita	0.20

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mu	Apr	May	Jun	Jul	Aug	Sap	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	21	16	23	13	20	6	4	10	32	36	45	46	75	34s
Struck and Lost	0	0	6	8	0	0	2	4	1	5	1	1	2	30
Total Take	21	16	2s	21	20	6	6	14	33	43	46	47	77	379
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	22.6	17.2	25.7	140	22.7	7.4	4.8	11.2	36.6	43.9	53.3	52.1	62.6	397.4
Struck and Lost	0.0	0.0	6.5	8.4	0.0	0.0	2.1	4.3	1.3	6.2	1.3	1.3	2.2	33.4
Total Take	22.6	17.2	32.2	23.2	22.7	7.4	6.9	15.5	40.1	50.1	54.5	63.4	66.0	430.8
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	34.4	21.6	30.5	19.1	26.2	7.6	5.3	13.8	43.3	56.0	67.6	69.7		3974
Struck and Lost	0.0	0.0	6.8	10.0	0.0	0.0	2.2	4.5	1.3	6.2	1.3	1.3		334
Total Take	34.4	21.8	37.3	29.1	26.2	7.0	7.5	18.3	44.5	62.2	66.8	70.9		430.8
Total Take (%)	8.0%	5.1%	6.7%	66%	65%	1.8%	1 7%	4.3%	10.3%	14.4%	16.0%	16.5%		100%
Cumulative Take	34.4	56.2	934	1226	1508	158.6	166.1	184.4	228.9	261.1	359.9	430.8		
Cum. Take (%)	8.0%	13.0%	21 7%	20.5%	35.0%	36.8%	38.6%	42.8%	53.1%	67.6%	83.5%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

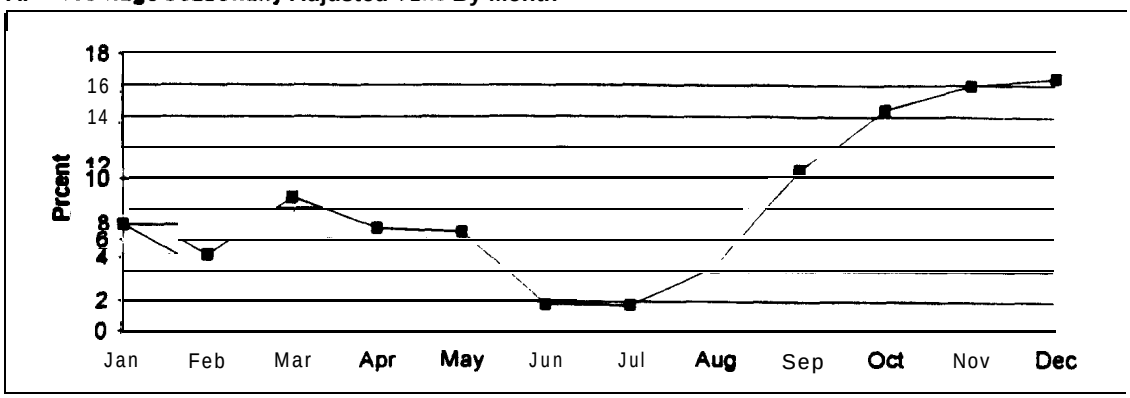
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	100	207%	119.6	30.1%
Adult Female	40	11 5%	45.9	11.6%
Adult Unknown Sex	35	100%	39.2	9.9%
Juvenile Male	13	37%	146	3.7%
Juvenile Female	15	43%	16.5	4.2%
Juvenile Unknown Sex	26	74%	26.9	7.3%
Pup Male	2	06%	2.1	0.5%
Pup Female	1	03%	1.0	0.3%
Pup Unknown Sex	12	34%	13.0	3.3%
Male Unknown Age	5	14%	5.9	1.5%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	100	267%	110.7	27.9%
Total	34s	100.0%	397.4	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

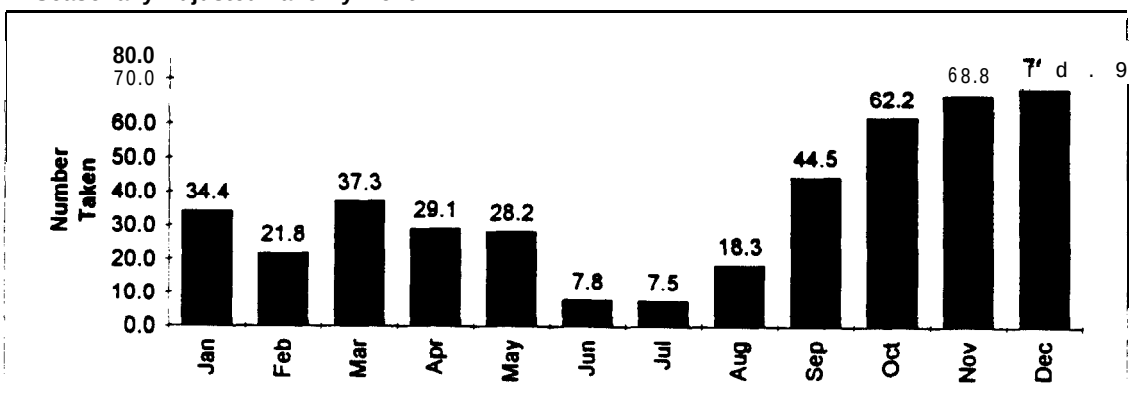
6/28/93 1:03 PM MMR2HS.XLS

HARBOR **SEAL (Phoca** vitulina) **TAKE ESTIMATES: NORTH PACIFIC RIM, 1992**

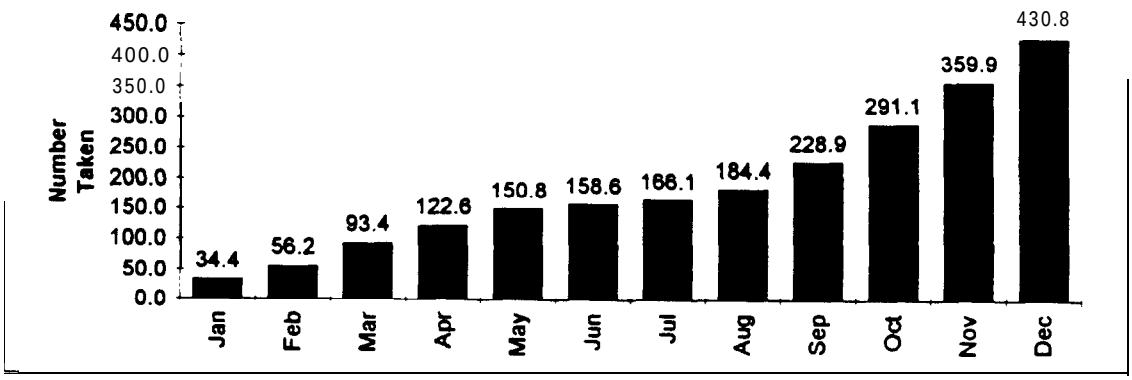
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:03 PM MMR2HS.XLS

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: UPPER KENAI - COOK INLET, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	27	53	80
Surveyed Households	16	47	63
Sampling Fraction	**59.3%**	**88.7%**	**78.8%**
Sample Household Membets	**56**	154	210
Estimated Household Members	**93.4**	**173.7**	**267.0**

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of* Native *Households:

Used 28.6%
Hunted 20.6%
Harvested 12.7%
Received 23.8%
Gave Away 15.9%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	51.6
Total Number Struck **and Lost**	**0.0**
Total Number Taken	51.6
Number Harvested Per **Capita**	**0.19**

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nw	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	2	20	0	1	2	0	2	0	0	4	0	0	4	35
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Take	2	20	0	1	2	0	2	0	0	4	0	0	4	35
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	2.7	26.7	0.0	1.9	3 0	0.0	3 6	0.0	0.0	5.9	0.0	0.0	7.6	51.6
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Take	2.7	26.7	0.0	1.s	3.0	0.0	3.6	0.0	0.0	5.9	0.0	0.0	7 6	51.6
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	2.7	26.7	0.0	3.4	4.5	0.0	6.6	0.0	0.0	7.4	0.0	0.0		51 6
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take	2.7	26.7	0.0	3.4	4.5	0.0	6.8	0.0	0.0	7.4	0.0	0 0		51 6
Total Take (%)	5.2%	51 7%	0.0%	66%	0.0%	00%	133%	00%	0.0%	144%	0.0%	00%		100%
Cumulative Take	2.7	2Q.3	29.3	32.0	37 3	373	441	44.1	44.1	51.6	51.6	51 6		
Cum. Take (%)	5 . 2 %	56.9%	56.9%	63.5%	72.3%	72.3%	656%	656%	65.6%	100.0%	100.0%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

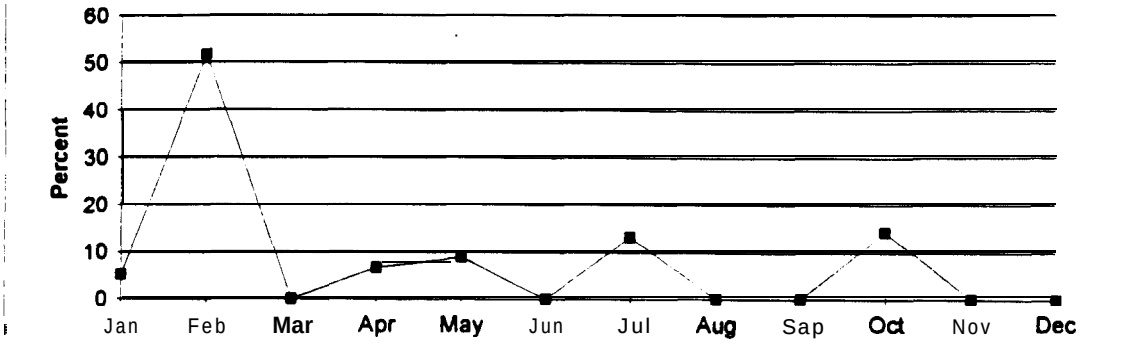
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	4	114%	6.5	12.5%
Adult Female	4	11 4%	5.7	11.0%
Adult Unknown Sex	16	51 4%	25.7	49.0%
Juvenile Male	1	29%	1.3	2.6%
Juvenile Female	0	00%	0.0	00%
Juvenile Unknown Sex	8	229%	12.4	24.0%
Pup Male	0	00%	0.0	0.0%
Pup Female	0	00%	0.0	0.0%
Pup Unknown Sex	0	00%	0.0	0.0%
Male Unknown Age	0	00%	0.0	0.0%
Female Unknown Age	0	00%	0.0	0.0%
Unknown Sex and Age	0	00%	0.0	0.0%
Total	35	100.0%	51.6	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

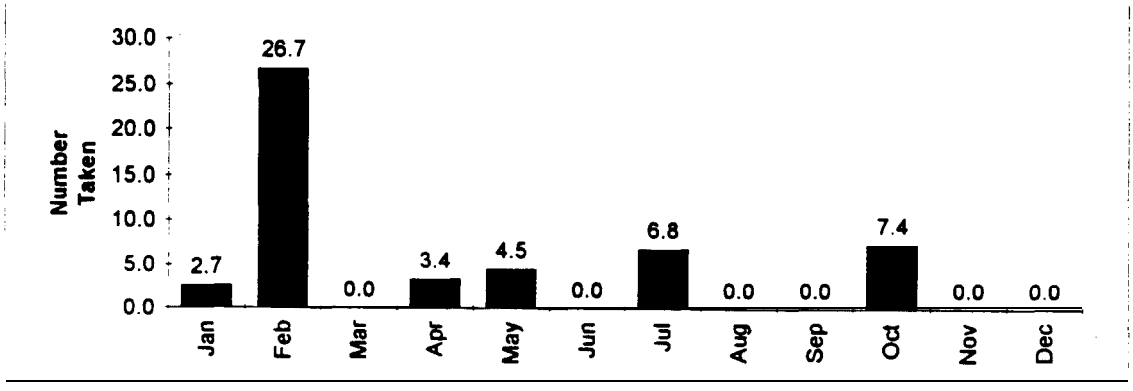
6/29/93 1:18 PM MMR3HS.XLS

HARBOR SEAL (Phoca vitulinr) TAKE ESTIMATES: UPPER KENAI - COOK INLET, 1992

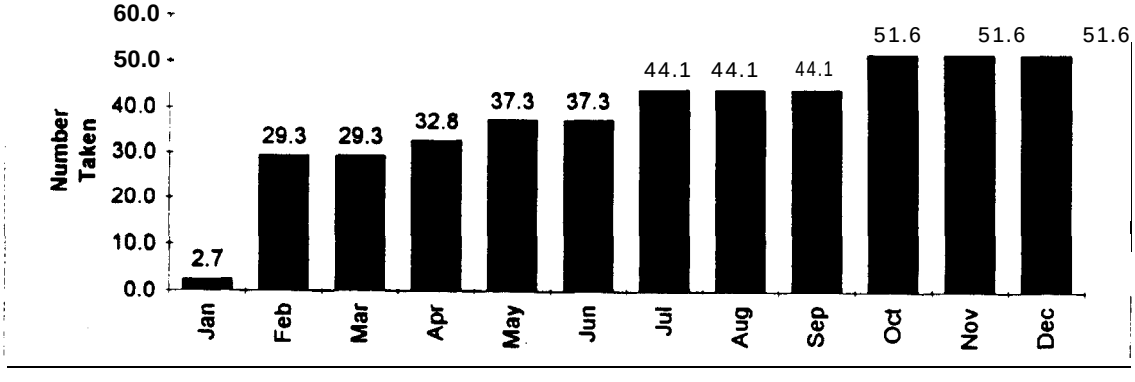
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish • d Game, Dii of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/29/93 1:18 PM MMR3HS.XLS

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: KODIAK ISLAND, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	117	466	583
Surveyed Households	99	198	297
Sampling Fraction	84.6%	42.5%	50.9%
Sample Household Members	341	024	965
Estimated Household Members	407.1	1290.2	1897.3

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

used	46.5%
Hunted	21.9%
Harvested	18.5%
Received	35.7%
Gave Away	23.6%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	225.5
Total Number Struck and Lost	15.6
Total Number Taken	241.1
Number Harvested Per Capita	0.13

HARBOR SEAL HARVEST BY SEASON

	Jan	Fob	Mar	Apr	May	Jun	Jul	Au9	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	9	10	13	8	5	1	8	8	7	12	24	20	50	175
Struck and Lost	1	1	0	0	0	0	2	1	0	2	3	1	2	13
Total Take	10	11	13	8	5	1	10	9	7	14	27	21	52	168
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	11.4	12.5	15.3	9.2	6.1	1.1	9.2	25.0	6.3	14.7	28.7	24.4	59.5	225.5
Struck and Lost	1.5	1.0	0.0	0.0	0.0	0.0	2.0	1.3	0.0	2.4	3.5	1.3	2.6	15.6
Total Take	12.9	13.5	15.3	9.2	6.1	1.1	11.2	26.3	8.3	17.1	32.2	25.1	62.1	241.1
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	15.2	16.2	21.5	11.5	9.6	1.5	16.3	25.9	10.7	21.2	39.3	36.6		225.5
Struck and Lost	1.5	1.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	3.0	4.2	2.0		15.6
Total Take	16.7	17.2	21.5	11.5	9.8	1.5	18.3	27.0	10.7	24.3	43.4	38.5		241.1
Total Take (%)	69%	7.1%	8.9%	4.6%	4.9%	0.6%	76%	11.5%	44%	10.1%	18.0%	16.0%		100%
Cumulative Take	16.7	33.9	55.3	66.8	76.6	78.1	86.4	124.2	134.9	159.2	202.6	241.1		
Cum. Take (%)	6.9%	14.0%	22.9%	27 7%	31.6%	32.4%	40.0%	51.5%	55.9%	66.0%	84.0%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

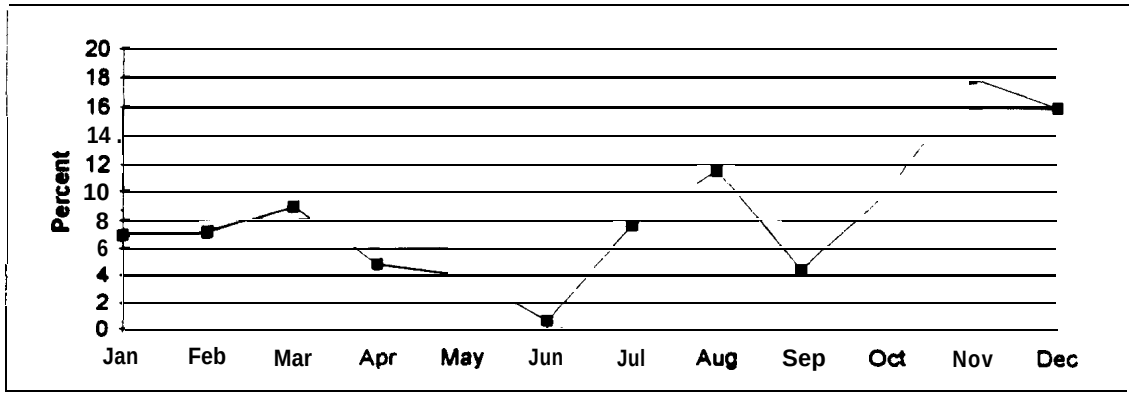
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	56	32.0%	68.8	30.5%
Adult Female	22	12.6%	42.0	19.0%
Adult Unknown Sex	27	15.4%	32.4	14.4%
Juvenile Male	24	13.7%	27.6	12.3%
Juvenile Female	9	5.1%	10.6	4.8%
Juvenile Unknown Sex	26	14.9%	30.9	13.7%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	1	0.6%	1.3	0.6%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	10	57%	10.0	48%
Total	175	100.0%	225.5	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

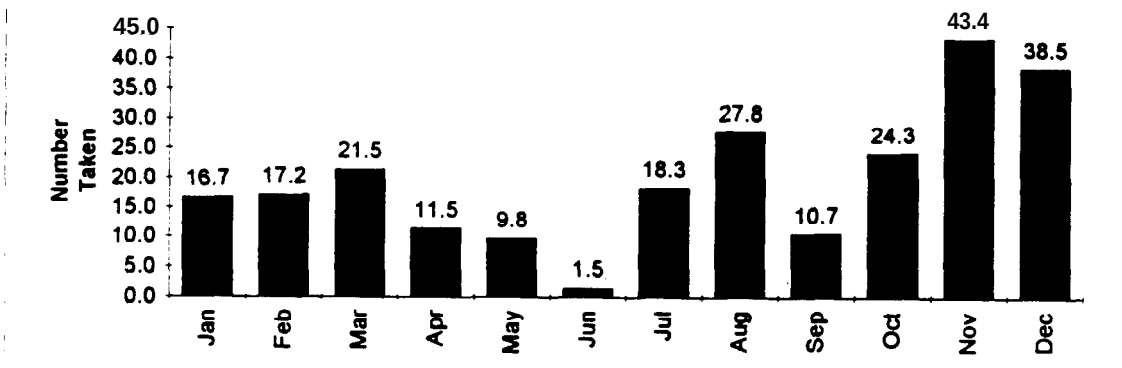
6/28/93 1:08 PM MMR4HS.XLS

HARBOR SEAL (*Phoca* vitulina) TAKE ESTIMATES: KODIAK ISLAND, 1992

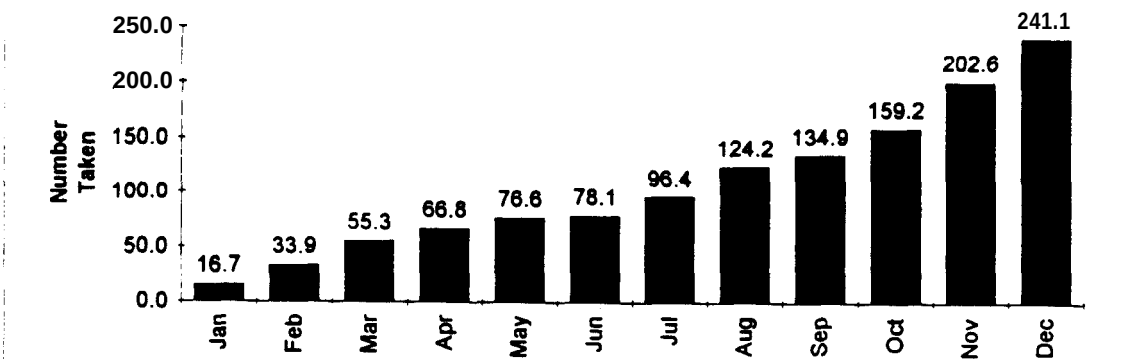
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted lake By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:08 PM

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HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: SOUTH ALASKA PENINSULA, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	32	407	439
Surveyed Households	20	285	305
Sampling Fradion	62.5%	70.0%	69.5%
Sampte Household Members	77	9 7 6	1055
Estimated Household Members	123.6	1397.6	1521.2

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

used	38.7%
Hunted	23.0%
Harvested	16.1%
Received	30.2%
Gave Away	19.0%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	115.5
Total Number Struck and Lost	13.1
Total Number Taken	128.6
Number Harvested Per Capita	0.08

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	4	5	4	4	6	5	6	10	5	11	13	8	2	05
Struck and Lost	0	0	0	1	1	0	1	1	1	0	1	2	2	10
Total Take	4	5	4	5	7	5	9	11	6	11	14	10	4	95
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	5.5	5.3	4.3	4.9	6.0	6.0	12.7	15.4	6.5	13.1	1 B.2	10.5	3.1	115.5
Struck and Lost	0.0	0.0	0.0	1.1	11	0.0	1.0	1.0	1.3	0.0	1.0	4.0	2.5	13.1
Total Take	5.5	5.3	4.3	6.0	9.2	6.0	13.7	16.4	7.6	13.1	19.2	14.5	5.6	126.6
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	5.7	5.3	4.3	5.0	6.2	6.3	13.2	16.0	6.7	13.3	16.7	10.7		115.5
Struck and Lost	0.1	0.1	0.1	1.2	1.2	0.1	1.1	1.1	1.6	0.1	1.1	5.1		13 1
Total Take	5.8	5.4	4.4	6.2	9.4	6.4	14.3	17.1	6.4	13.4	19.8	15.6		1266
Total Take (%)	4.5%	4.2%	3.4%	4.6%	7.3%	6.5%	11.2%	13.3%	6.6%	10.4%	15.4%	12.3%		100%
Cumulative Take	5.6	11.2	15.7	21.6	31.3	39.7	54.0	71.1	79.6	93.0	112.6	126.6		
Cum. Take (%)	4.5%	6.7%	12.2%	17.0%	24.3%	30.9%	42.0%	55.3%	61.9%	72.3%	67.7%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

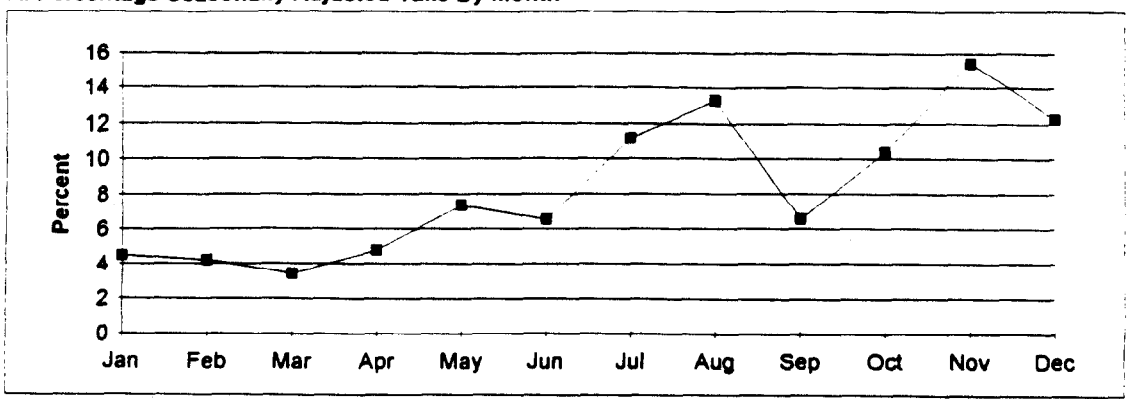
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	26	32.9%	40.6	35.2%
Adult Female	4	4.7%	6.0	5.9%
Adult Unknown Sex	37	435%	49.6	43.0%
Juvenile Male	2	2.4%	3.1	2.7%
Juvenile Female	0	0.0%	0.0	0.0%
Juvenile Unknown Sex	7	0.2%	7.3	6.3%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	1	12%	1.1	0.9%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	6	7.1%	7.0	6.1%
Total	05	100.0%	115.5	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

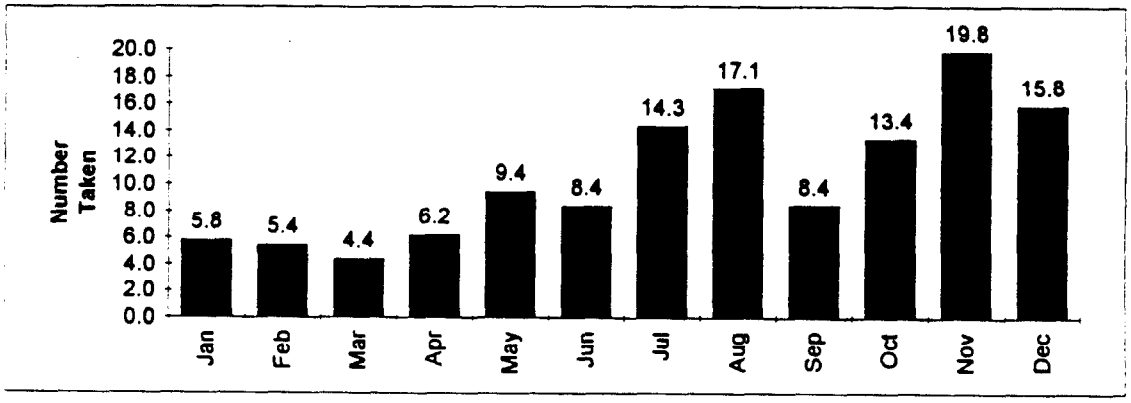
6/28/93 1:09 PM MMR5HS.XLS

HARBOR SEAL (Phoca vitulina) TAKE ESTIMATES: SOUTH ALASKA PENINSULA, 1992

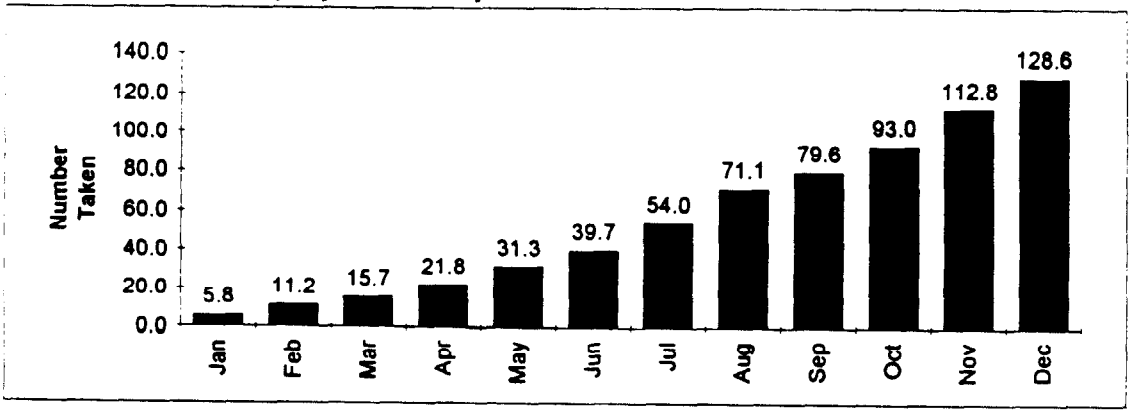
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:09 PM

MMR5HS.XLS

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: ALEUTIAN - PRIBILOF ISLANDS, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	87	234	321
Surveyed Households	74	165	239
Sampling Fraction	85.1%	70.5%	74.5%
Sample Household Members	299	522	821
Estimated Household Members	350.1	758.6	1108.6

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	36.8%
Hunted	15.1%
Harvested	10.0%
Received	33.1%
Gave Away	18.0%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	96.6
Total Number Struck and Lost	22.5
Total Number Taken	119.2
Number Harvested Per Capita	0.09

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	1	1	2	1	7	4	7	1	4	2	6	4	42	82
Struck and Lost	0	1	0	0	1	1	1	2	0	3	3	2	6	20
Total Take	1	2	2	1	8	5	8	3	4	5	9	6	48	102
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	1.1	1.1	2.3	1.2	8.7	4.3	8.2	1.1	4.6	2.5	6.8	4.5	50.2	96.6
Struck and Lost	0.0	1.2	0.0	0.0	1.1	1.1	1.1	2.3	0.0	3.3	3.3	2.3	6.9	22.5
Total Take	1.1	2.3	2.3	1.2	9.7	5.4	9.3	3.4	4.6	5.8	10.1	6.9	57.2	119.2
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	3.7	3.7	6.4	1.6	19.0	6.9	16.7	1.6	10.2	5.9	14.4	6.5		96.6
Struck and Lost	0.0	1.2	0.0	0.0	1.1	1.1	1.1	4.8	0.0	5.0	5.0	3.5		22.5
Total Take	3.7	4.8	6.4	1.6	20.1	7.9	17.8	6.3	10.2	10.9	19.4	10.0		119.2
Total Take (%)	3.1%	4.0%	5.4%	1.4%	16.9%	6.7%	14.9%	5.3%	8.5%	9.1%	16.3%	8.4%		100%
Cumulative Take	3.7	8.5	14.9	16.5	36.6	44.6	62.4	68.7	78.9	89.8	109.2	119.2		
Cum. Take (%)	3.1%	7.1%	12.5%	13.9%	30.7%	37.4%	52.3%	57.6%	66.2%	75.3%	91.6%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	20	24.4%	23.9	24.7%
Adult Female	7	8.5%	8.1	8.4%
Adult Unknown Sex	8	9.8%	10.4	10.7%
Juvenile Male	21	25.6%	24.3	25.1%
Juvenile Female	15	18.3%	17.4	18.0%
Juvenile Unknown Sex	7	8.5%	8.2	8.5%
Pup Male	2	2.4%	2.2	2.3%
Pup Female	2	2.4%	2.2	2.3%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	0	0.0%	0.0	0.0%
Total	82	100.0%	96.6	100.0%

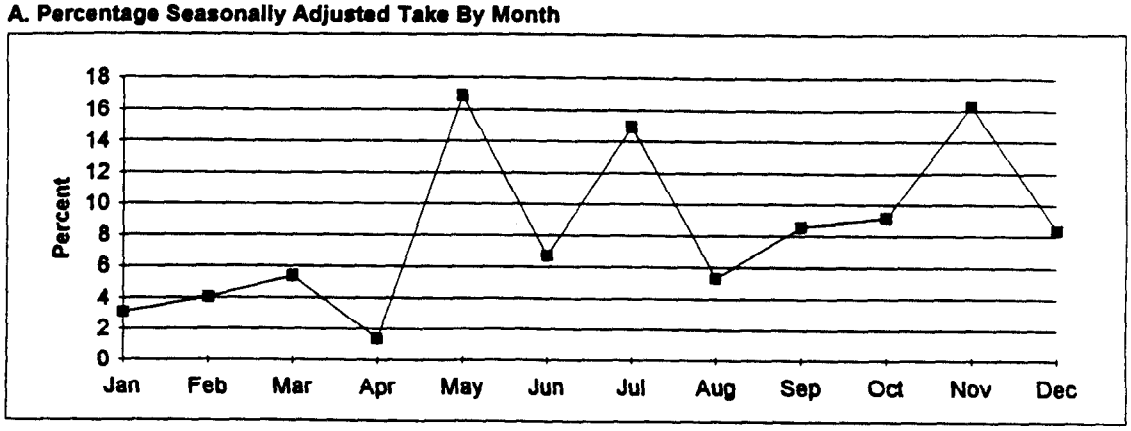
SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

7/28/93 7:36 AM

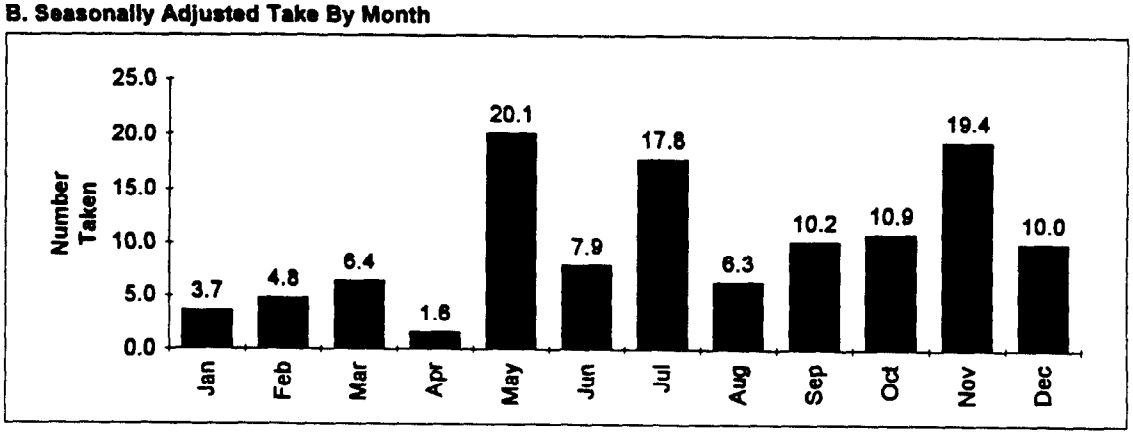
MMR6HS.XLS

HARBOR SEAL (Phoca vitulina) TAKE ESTIMATES: ALEUTIAN - PRIBILOF ISLANDS, 1992

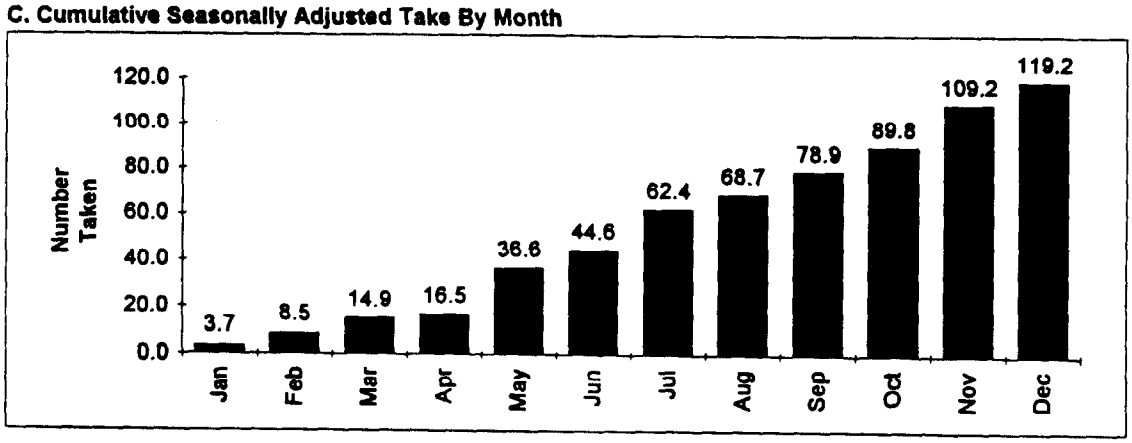
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

7/28/93 7:36 AM

MMR6HS.XLS

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: SOUTH BRISTOL BAY, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	18	264	282
Surveyed Households	18	180	198
Sampling Fraction	100.0%	68.2%	70.2%
Sample Household Members	67	558	625
Estimated Household Members	67.0	820.5	887.5

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	51.0%
Hunted	19.7%
Harvested	15.2%
Received	46.0%
Gave Away	26.3%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	99.0
Total Number Struck and Lost	55.1
Total Number Taken	154.1
Number Harvested Per Capita	0.11

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	1	0	2	9	10	9	0	23	10	1	0	0	9	74
Struck and Lost	0	0	1	2	2	4	6	22	4	1	0	3	0	45
Total Take	1	0	3	11	12	13	6	45	14	2	0	3	9	119
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	1.1	0.0	2.5	11.0	13.8	12.8	0.0	29.3	13.9	1.2	0.0	0.0	13.5	99.0
Struck and Lost	0.0	0.0	1.1	2.0	2.0	6.0	8.2	26.1	5.1	1.2	0.0	3.5	0.0	55.1
Total Take	1.1	0.0	3.6	13.0	15.8	18.8	8.2	55.4	19.0	2.3	0.0	3.5	13.5	154.1
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	1.1	0.0	2.5	11.8	13.8	17.3	0.0	36.8	14.6	1.2	0.0	0.0		99.0
Struck and Lost	0.0	0.0	1.1	2.0	2.0	6.0	8.2	26.1	5.1	1.2	0.0	3.5		55.1
Total Take	1.1	0.0	3.6	13.8	15.8	23.3	8.2	62.9	19.7	2.3	0.0	3.5		154.1
Total Take (%)	0.7%	0.0%	2.3%	8.9%	10.2%	15.1%	5.3%	40.8%	12.8%	1.5%	0.0%	2.2%		100%
Cumulative Take	1.1	1.1	4.7	18.5	34.2	57.5	65.7	128.6	148.3	150.6	150.6	154.1		
Cum. Take (%)	0.7%	0.7%	3.0%	12.0%	22.2%	37.3%	42.6%	83.4%	96.3%	97.8%	97.8%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

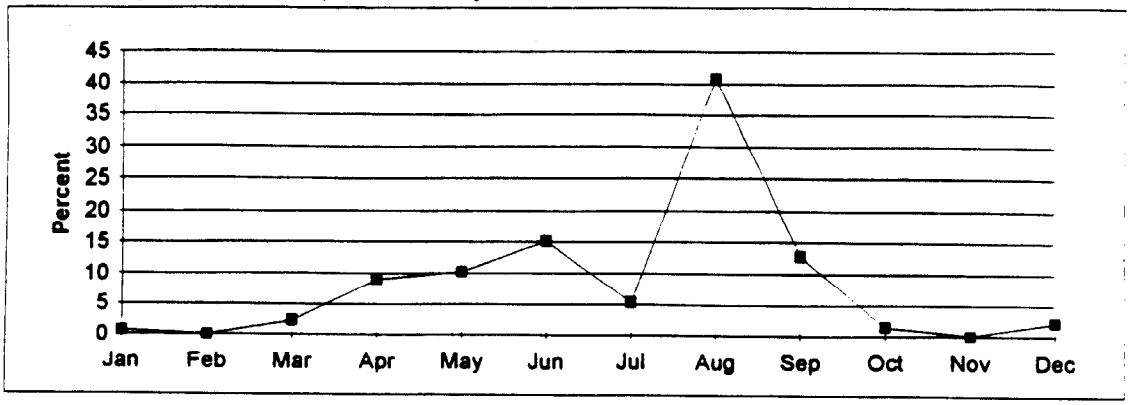
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	5	6.8%	6.6	6.7%
Adult Female	10	13.5%	10.5	10.6%
Adult Unknown Sex	32	43.2%	45.1	45.5%
Juvenile Male	1	1.4%	1.1	1.1%
Juvenile Female	1	1.4%	1.1	1.1%
Juvenile Unknown Sex	7	9.5%	9.9	10.0%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	4	5.4%	7.0	7.1%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	14	18.9%	17.6	17.8%
Total	74	100.0%	99.0	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

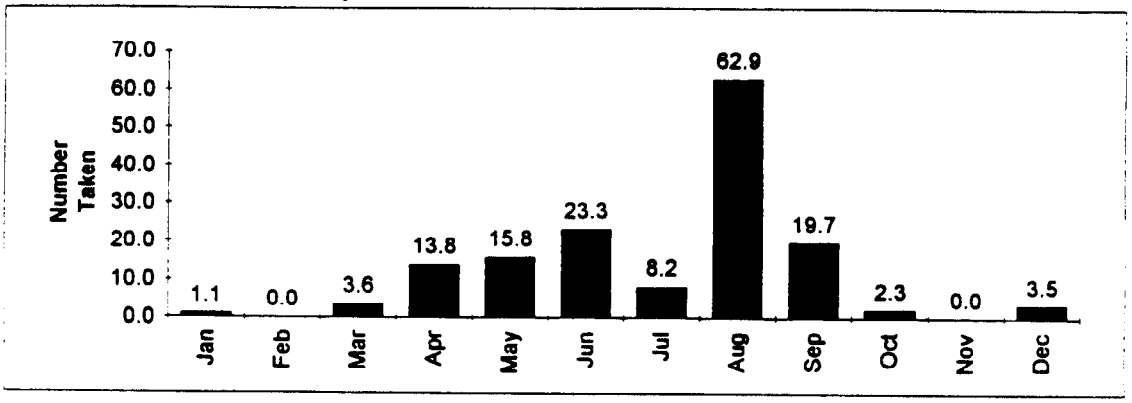
6/28/93 1:15 PM MMR7HS.XLS

HARBOR SEAL (Phoca vitulina) TAKE ESTIMATES: SOUTH BRISTOL BAY, 1992

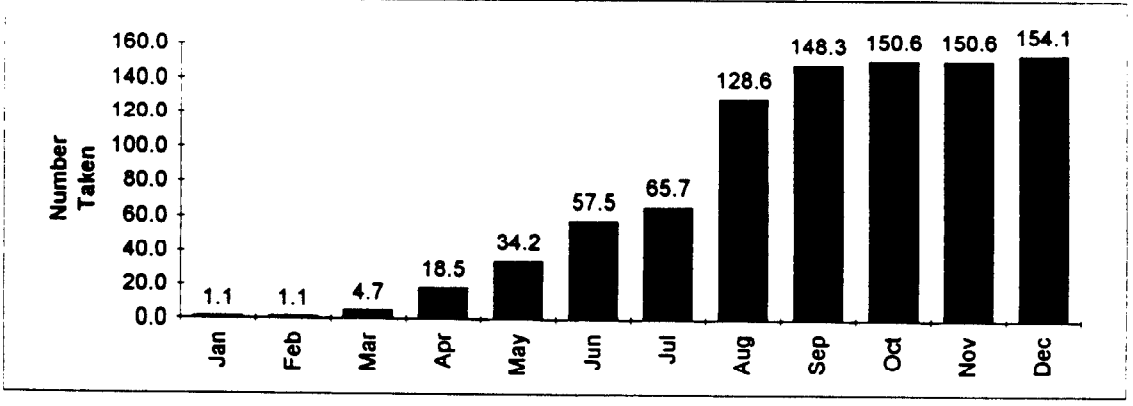
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:15 PM

MMR7HS.XLS

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

SAMPLING DESIGN: CENSUS

	Active	Other	Total
Total Native Households	102	610	712
Surveyed Households	77	139	216
Sampling Fraction	75.5%	22.8%	30.3%
Sample Household Members	374	533	907
Estimated Household Members	495.4	2339.1	2834.5

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	88.0%
Hunted	50.9%
Harvested	34.7%
Received	72.7%
Gave Away	50.5%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	58.4
Total Number Struck and Lost	13.1
Total Number Taken	71.6
Number Harvested Per Capita	0.02

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST AND TAKE BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	0	0	7	3	3	9	0	0	0	0	22
Struck and Lost	0	0	0	0	0	1	1	5	1	0	0	0	1	9
Total Take	0	0	0	0	0	8	4	8	10	0	0	0	1	31
ESTIMATED HARVEST AND TAKE BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	9.3	27.9	4.4	16.0	0.0	0.0	0.0	0.8	58.4
Struck and Lost	0.0	0.0	0.0	0.0	0.0	1.3	1.3	7.3	1.9	0.0	0.0	0.0	1.4	13.1
Total Take	0.0	0.0	0.0	0.0	0.0	10.6	29.2	11.7	17.9	0.0	0.0	0.0	2.2	71.6
ESTIMATED SEASONALLY ADJUSTED HARVEST AND TAKE BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	9.4	28.3	4.5	16.2	0.0	0.0	0.0		58.4
Struck and Lost	0.0	0.0	0.0	0.0	0.0	1.5	1.4	8.1	2.1	0.0	0.0	0.0		13.1
Total Take	0.0	0.0	0.0	0.0	0.0	10.9	29.7	12.6	18.3	0.0	0.0	0.0		71.6
Total Take (%)	0.0%	0.0%	0.0%	0.0%	0.0%	15.2%	41.6%	17.6%	25.6%	0.0%	0.0%	0.0%		100%
Cumulative Take	0.0	0.0	0.0	0.0	0.0	10.9	40.6	53.2	71.6	71.6	71.6	71.6		
Cum. Take (%)	0.0%	0.0%	0.0%	0.0%	0.0%	15.2%	56.8%	74.4%	100.0%	100.0%	100.0%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	7.0	31.8%	10.0	17.2%
Adult Female	2.0	9.1%	3.2	5.4%
Adult Unknown Sex	7.0	31.8%	34.9	59.9%
Juvenile Male	1.0	4.5%	1.6	2.7%
Juvenile Female	0.0	0.0%	0.0	0.0%
Juvenile Unknown Sex	3.0	13.6%	4.4	7.5%
Pup Male	0.0	0.0%	0.0	0.0%
Pup Female	0.0	0.0%	0.0	0.0%
Pup Unknown Sex	1.0	4.5%	1.6	2.7%
Male Unknown Age	0.0	0.0%	0.0	0.0%
Female Unknown Age	0.0	0.0%	0.0	0.0%
Unknown Sex and Age	1.0	4.5%	2.7	4.6%
Total	22	100.0%	58.4	100.0%

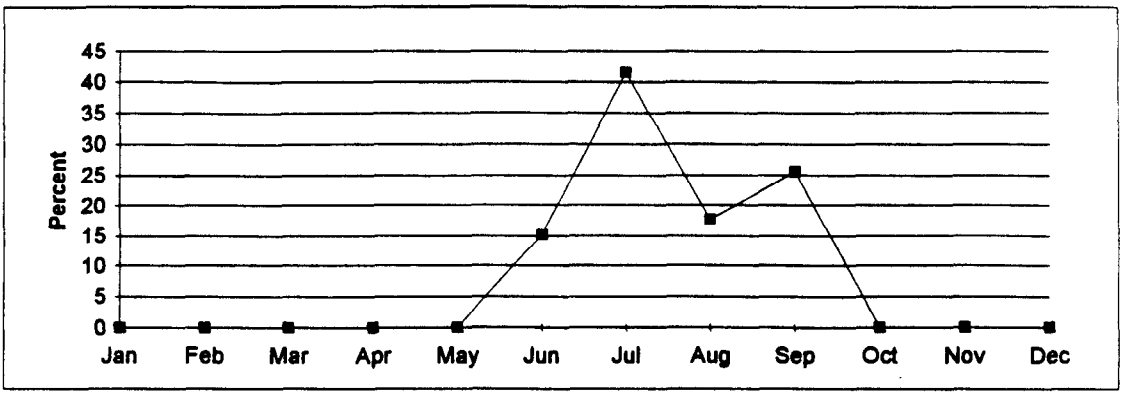
SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska, with assistance from the City of Akhiok and Akhiok Tribal Council, 1993.

7/2/93 3:14 PM

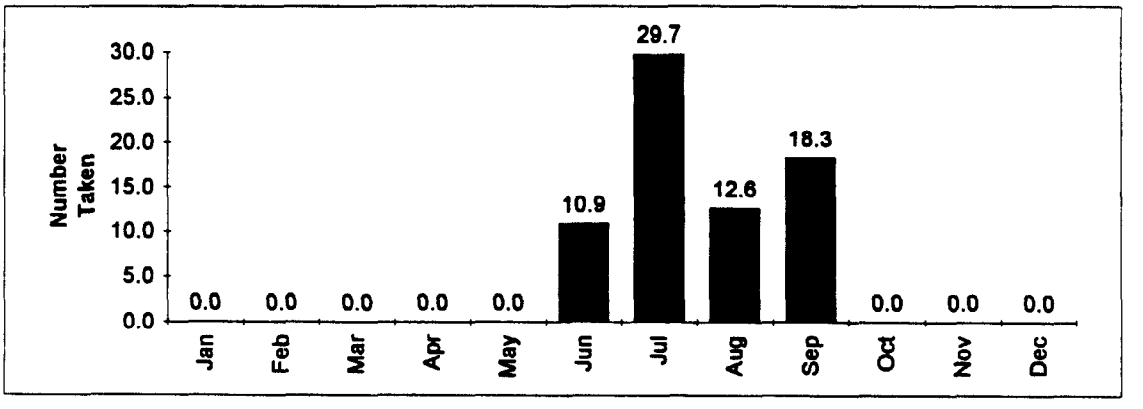
MMR8HSH.XLS

HARBOR SEAL (Phoca vitulina) TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

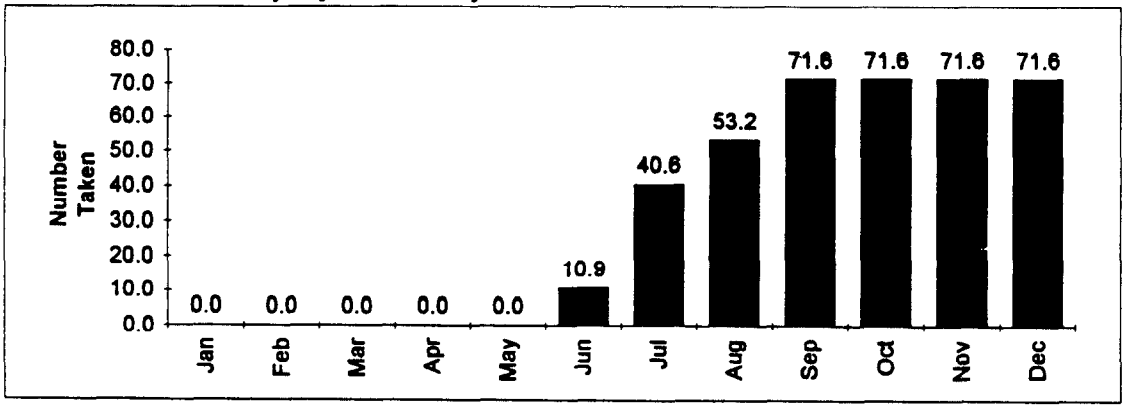
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska, with assistance from the City of Akhiok and Akhiok Tribal Council, 1993.

7/2/93 3:14 PM

MMR8HSH.XLS

HARBOR SEAL (Phoca vitulina) HARVEST AND TAKE ESTIMATES: LAKE ILIAMNA, 1992

SAMPLING DESIGN: MIXED

Total Native Households	52
Surveyed Households	41
Sampling Fraction	78.8%
Sample Household Members	187
Estimated Household Members	236.2

HARBOR SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	61.0%
Hunted	34.1%
Harvested	26.8%
Received	39.0%
Gave Away	19.5%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	34.1
Total Number Struck and Lost	0.0
Total Number Taken	34.1
Number Harvested Per Capita	0.14

HARBOR SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	0	0	0	0	0	0	0	0	0	27	27
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Take	0	0	0	0	0	0	0	0	0	0	0	0	27	27
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.1	34.1
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Take	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.1	34.1
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		34.1
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8		34.1
Total Take (%)	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%		100%
Cumulative Take	2.8	5.7	8.5	11.4	14.2	17.0	19.9	22.7	25.5	28.4	31.2	34.1		
Cum. Take (%)	8.3%	16.7%	25.0%	33.3%	41.7%	50.0%	58.3%	66.7%	75.0%	83.3%	91.7%	100.0%		

HARBOR SEAL HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	0	0.0%	0.0	0.0%
Adult Female	0	0.0%	0.0	0.0%
Adult Unknown Sex	0	0.0%	0.0	0.0%
Juvenile Male	0	0.0%	0.0	0.0%
Juvenile Female	0	0.0%	0.0	0.0%
Juvenile Unknown Sex	0	0.0%	0.0	0.0%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	11	40.7%	13.5	39.8%
Female Unknown Age	4	14.8%	4.9	14.5%
Unknown Sex and Age	12	44.4%	15.6	45.8%
Total	27	100.0%	34.1	100.0%

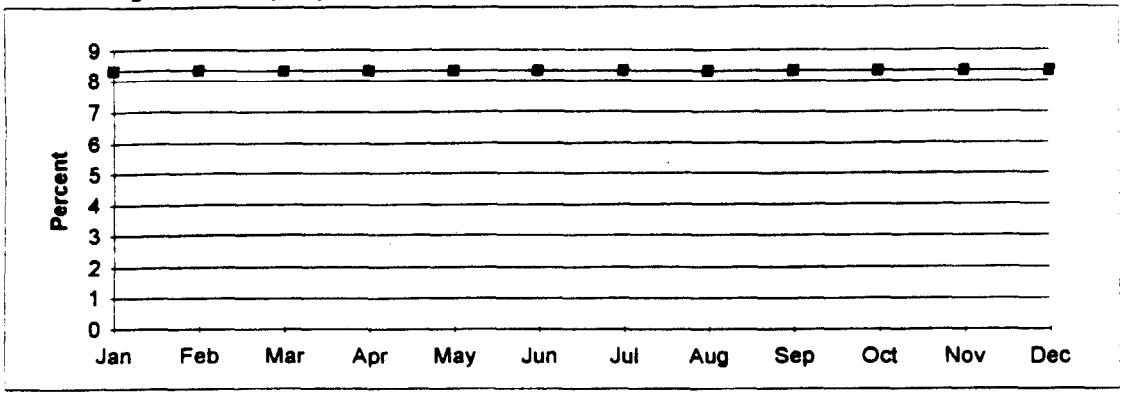
SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:19 PM

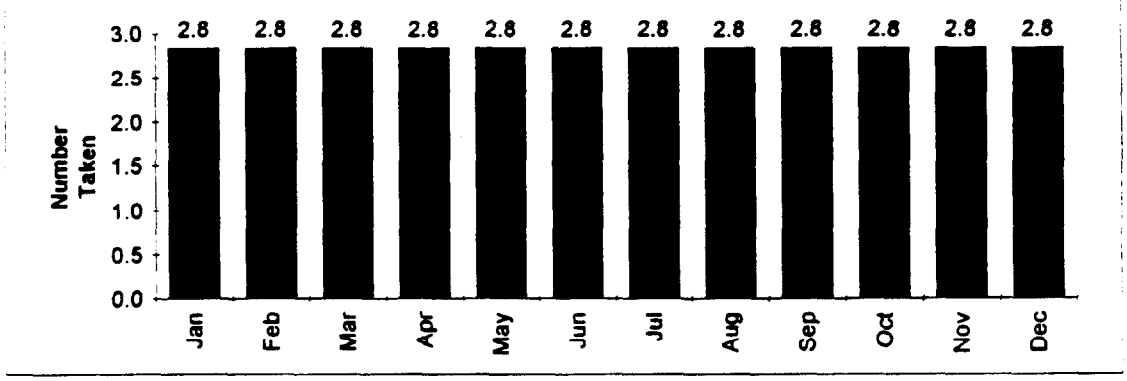
MMR9HS.XLS

HARBOR SEAL (Phoca vitulina) TAKE ESTIMATES: LAKE ILIAMNA, 1992

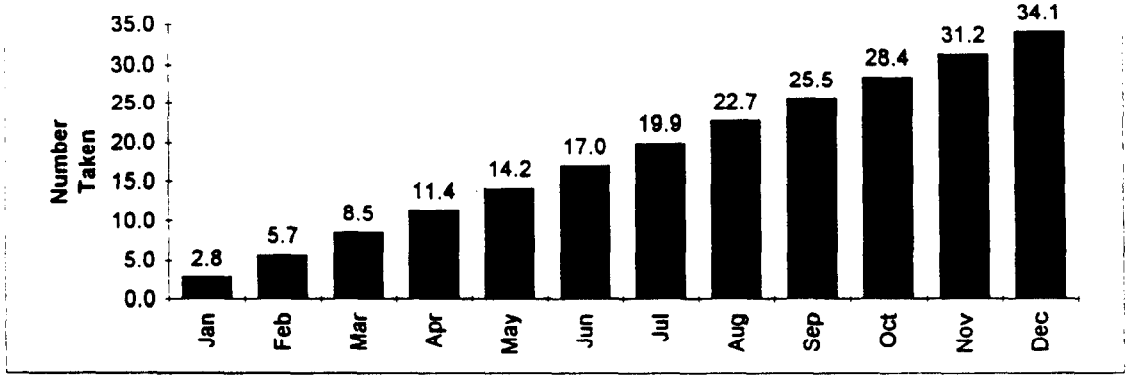
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:19 PM MMR9HS.XLS

HARBOR SEAL AND SPOTTED SEAL HARVEST AND TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	102	610	712
Surveyed Households	77	139	216
Sampling Fraction	75.5%	22.8%	30.3%
Sample Household Members	374	533	907
Estimated Household Members	500.0	2132.3	2632.2

HARBOR SEAL AND SPOTTED SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	88.0%
Hunted	50.9%
Harvested	34.7%
Received	72.7%
Gave Away	50.5%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	422.5
Total Number Struck and Lost	85.6
Total Number Taken	508.2
Number Harvested Per Capita	0.16

HARBOR SEAL AND SPOTTED SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Tota
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	3	9	42	85	51	7	3	3	9	21	8	0	6	24
Struck and Lost	1	0	7	13	3	1	1	5	1	9	8	0	9	5
Total Take	4	9	49	98	54	8	4	8	10	30	16	0	15	30
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	5.5	12.6	72.7	127.5	87.3	9.3	27.9	4.4	16.0	36.7	13.3	0.0	9.5	422.5
Struck and Lost	1.6	0.0	12.5	14.8	3.9	1.3	1.3	7.3	1.9	14.9	12.6	0.0	13.6	85.6
Total Take	7.0	12.6	85.1	142.3	91.2	10.6	29.2	11.7	17.9	51.6	25.9	0.0	23.1	508.2
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	5.6	12.9	75.1	129.8	88.9	9.5	27.9	4.5	16.5	38.0	13.8	0.0		422.5
Struck and Lost	2.0	0.0	15.6	15.8	4.9	1.8	1.3	8.2	1.9	18.6	15.7	0.0		85.6
Total Take	7.6	12.9	90.6	145.5	93.8	11.3	29.2	12.7	18.4	56.6	29.5	0.0		508.2
Total Take (%)	1.5%	2.5%	17.8%	28.6%	18.5%	2.2%	5.7%	2.5%	3.6%	11.1%	5.8%	0.0%		100%
Cumulative Take	7.6	20.5	111.2	256.7	350.4	361.8	391.0	403.7	422.0	478.6	508.2	508.2		
Cum. Take (%)	1.5%	4.0%	21.9%	50.5%	69.0%	71.2%	76.9%	79.4%	83.1%	94.2%	100.0%	100.0%		

HARBOR SEAL AND SPOTTED SEAL HARVEST B

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	39	15.8%	63.0	14.9%
Adult Female	20	8.1%	34.0	8.1%
Adult Unknown Sex	84	34.0%	152.0	36.0%
Juvenile Male	13	5.3%	19.3	4.6%
Juvenile Female	9	3.6%	14.2	3.4%
Juvenile Unknown Sex	65	26.3%	102.8	24.3%
Pup Male	4	1.6%	17.6	4.2%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	9	3.6%	13.3	3.2%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	4	1.6%	6.3	1.5%
Total	247	100.0%	422.5	100.0%

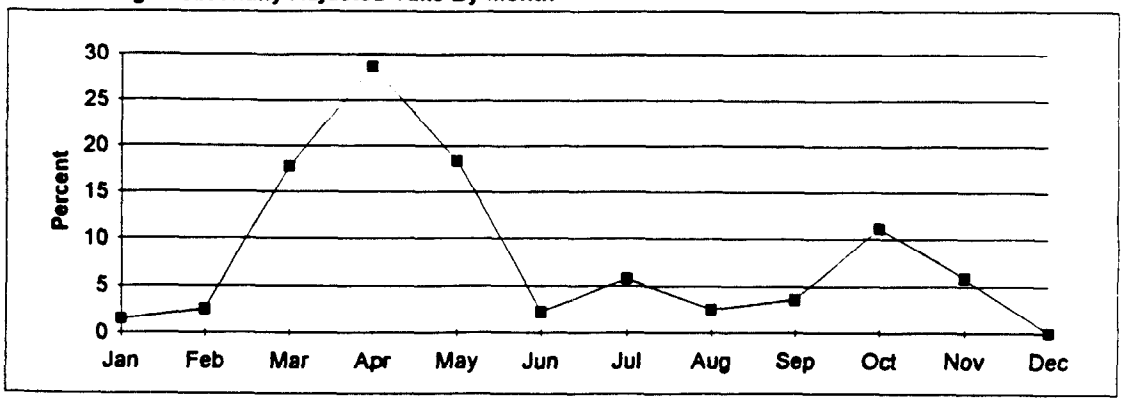
SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/29/93 1:55 PM

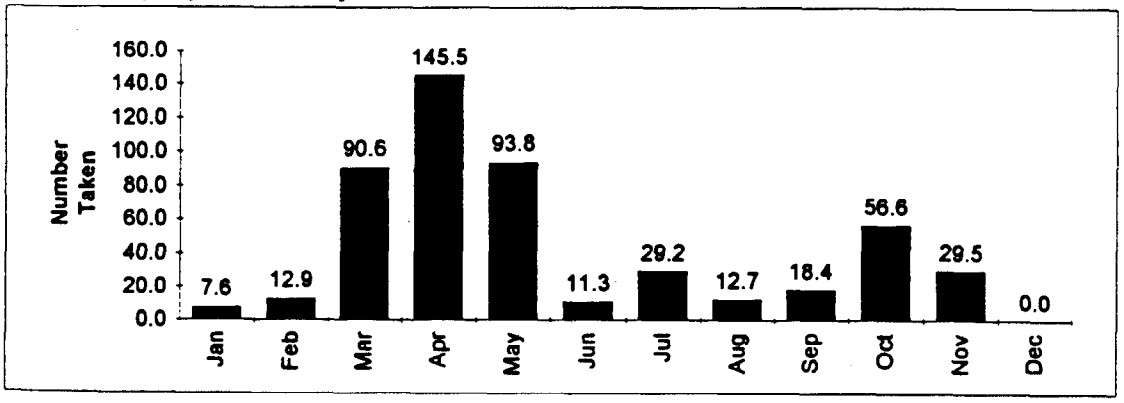
MMR8HS.XLS

HARBOR SEAL AND SPOTTED SEAL TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

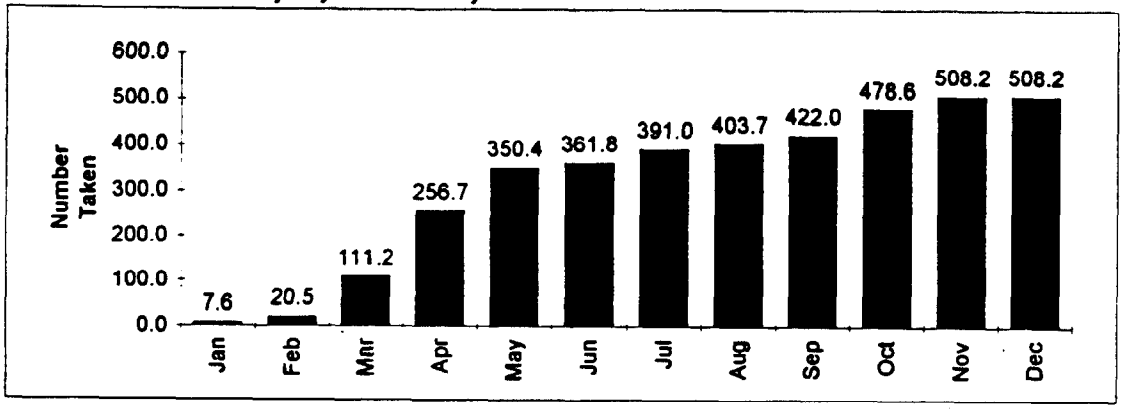
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/29/93 1:55 PM

MMR8HS.XLS

SPOTTED SEAL (Phoca largha) HARVEST AND TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

SAMPLING DESIGN: CENSUS

	Active	Other	Total
Total Native Households	102	610	712
Surveyed Households	77	139	216
Sampling Fraction	75.5%	22.8%	30.3%
Sample Household Members	374	533	907
Estimated Household Members	495.4	2339.1	2834.5

SPOTTED SEAL HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	88.0%
Hunted	50.9%
Harvested	34.7%
Received	72.7%
Gave Away	50.5%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	364.2
Total Number Struck and Lost	72.5
Total Number Taken	436.7
Number Harvested Per Capita	0.13

SPOTTED SEAL HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST AND TAKE BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	3	9	42	85	51	0	0	0	0	21	8	0	6	225
Struck and Lost	1	0	7	13	3	0	0	0	0	9	8	0	8	49
Total Take	4	9	49	98	54	0	0	0	0	30	16	0	14	274
ESTIMATED HARVEST AND TAKE BY COMMUNITY (EXPANDED)														
Harvest	5.5	12.6	72.7	127.5	87.3	0.0	0.0	0.0	0.0	36.7	13.3	0.0	8.7	364.2
Struck and Lost	1.6	0.0	12.5	14.8	3.9	0.0	0.0	0.0	0.0	14.9	12.6	0.0	12.2	72.5
Total Take	7.0	12.6	85.1	142.3	91.2	0.0	0.0	0.0	0.0	51.6	25.9	0.0	20.9	436.7
ESTIMATED SEASONALLY ADJUSTED HARVEST AND TAKE BY COMMUNITY (EXPANDED)														
Harvest	5.6	12.9	74.4	130.6	89.4	0.0	0.0	0.0	0.0	37.6	13.7	0.0		364.2
Struck and Lost	1.9	0.0	15.0	17.9	4.6	0.0	0.0	0.0	0.0	17.9	15.2	0.0		72.5
Total Take	7.5	12.9	89.4	148.4	94.1	0.0	0.0	0.0	0.0	55.5	28.8	0.0		436.7
Total Take (%)	1.7%	2.9%	20.5%	34.0%	21.5%	0.0%	0.0%	0.0%	0.0%	12.7%	6.6%	0.0%		100%
Cumulative Take	7.5	20.4	109.8	258.2	352.3	352.3	352.3	352.3	352.3	407.8	436.7	436.7		
Cum. Take (%)	1.7%	4.7%	25.1%	59.1%	80.7%	80.7%	80.7%	80.7%	80.7%	93.4%	100.0%	100.0%		

SPOTTED SEAL HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	32.0	14.2%	52.9	14.5%
Adult Female	18.0	8.0%	30.9	8.5%
Adult Unknown Sex	77.0	34.2%	117.0	32.1%
Juvenile Male	12.0	5.3%	17.8	4.9%
Juvenile Female	9.0	4.0%	14.2	3.9%
Juvenile Unknown Sex	62.0	27.6%	98.4	27.0%
Pup Male	4.0	1.8%	17.6	4.8%
Pup Female	0.0	0.0%	0.0	0.0%
Pup Unknown Sex	8.0	3.6%	11.8	3.2%
Male Unknown Age	0.0	0.0%	0.0	0.0%
Female Unknown Age	0.0	0.0%	0.0	0.0%
Unknown Sex and Age	3.0	1.3%	3.7	1.0%
Total	225	100.0%	364.2	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska, with assistance from the City of Akhiok and Akhiok Tribal Council, 1993.

7/2/93 3:12 PM

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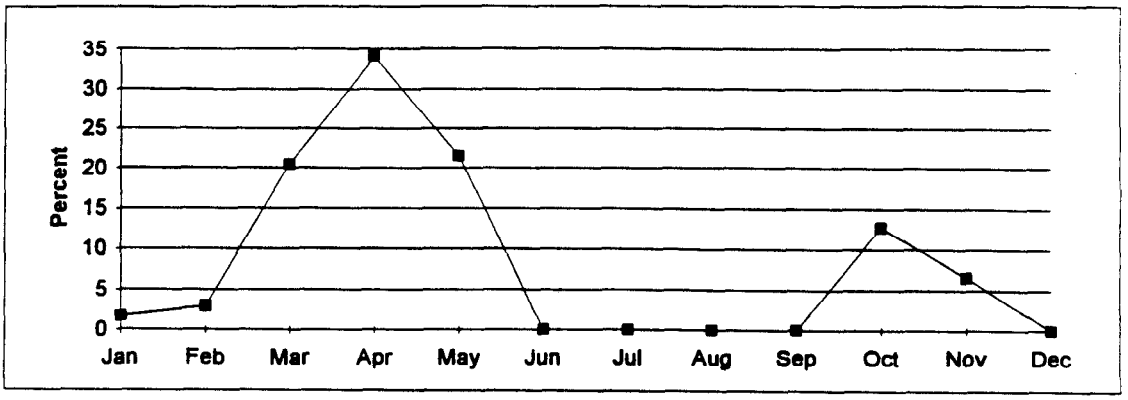
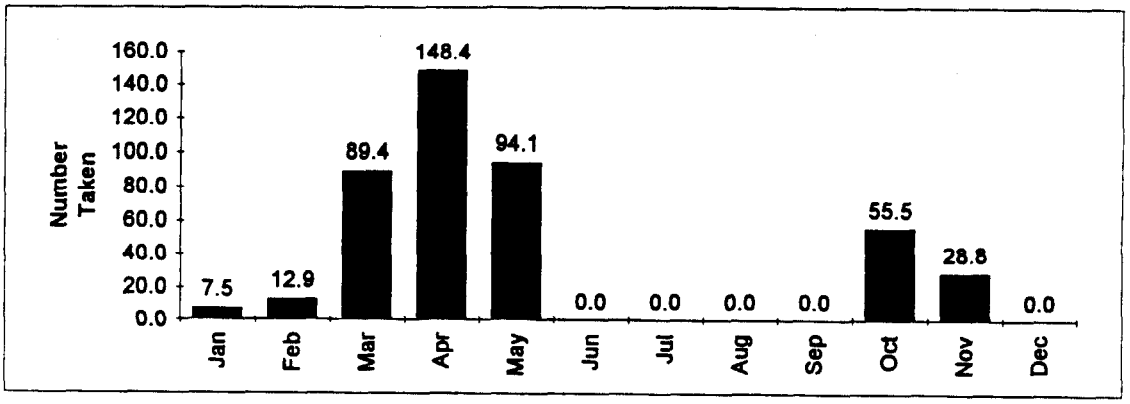
SPOTTED SEAL (Phoca largha) TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

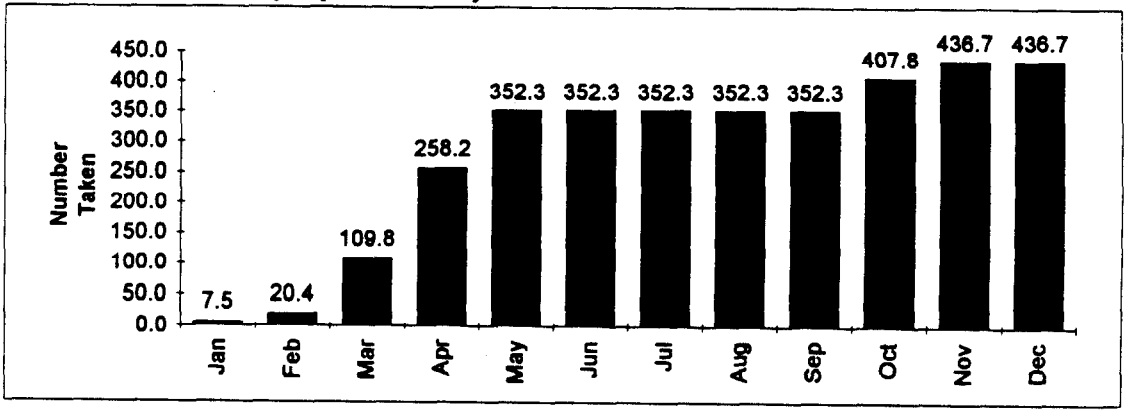
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska, with assistance from the City of Akhiok and Akhiok Tribal Council, 1993.

7/2/93 3:12 PM

MMR8HSS.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: SOUTHEAST ALASKA, 1992

SAMPLING DESIGN: Chain Referral and Random of "Hunters" only

	Active	Other	Total
Total Native Households	572	16	588
Surveyed Households	460	14	474
Sampling Fraction	80.4%	87.5%	80.6%
Sample Household Members	1811	53	1864
Estimated Household Members	2242.5	60.4	2302.9

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	0.8%
Hunted	0.6%
Harvested	0.4%
Received	0.4%
Gave Away	0.0%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	5.2
Total Number Struck and Lost	1.3
Total Number Taken	6.4
Number Harvested Per Capita	0.00

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	1	0	0	0	1	0	0	1	1	0	0	0	0	4
Struck and Lost	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Take	2	0	0	0	1	0	0	1	1	0	0	0	0	5
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	1.3	0.0	0.0	0.0	1.4	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	5.2
Struck and Lost	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Total Take	2.5	0.0	0.0	0.0	1.4	0.0	0.0	1.3	1.3	0.0	0.0	0.0	0.0	6.4
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	1.3	0.0	0.0	0.0	1.4	0.0	0.0	1.3	1.3	0.0	0.0	0.0		5.2
Struck and Lost	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1.3
Total Take	2.5	0.0	0.0	0.0	1.4	0.0	0.0	1.3	1.3	0.0	0.0	0.0		6.4
Total Take (%)	39.2%	0.0%	0.0%	0.0%	21.6%	0.0%	0.0%	19.6%	19.6%	0.0%	0.0%	0.0%		100%
Cumulative Take	2.5	2.5	2.5	2.5	3.9	3.9	3.9	5.2	6.4	6.4	6.4	6.4		
Cum. Take (%)	39.2%	39.2%	39.2%	39.2%	60.8%	60.8%	60.8%	80.4%	100.0%	100.0%	100.0%	100.0%		

SEA LION HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	1	25.0%	1.3	24.4%
Adult Female	0	0.0%	0.0	0.0%
Adult Unknown Sex	2	50.0%	2.7	51.3%
Juvenile Male	0	0.0%	0.0	0.0%
Juvenile Female	0	0.0%	0.0	0.0%
Juvenile Unknown Sex	1	25.0%	1.3	24.4%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	0	0.0%	0.0	0.0%
Total	4	100.0%	5.2	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:24 PM

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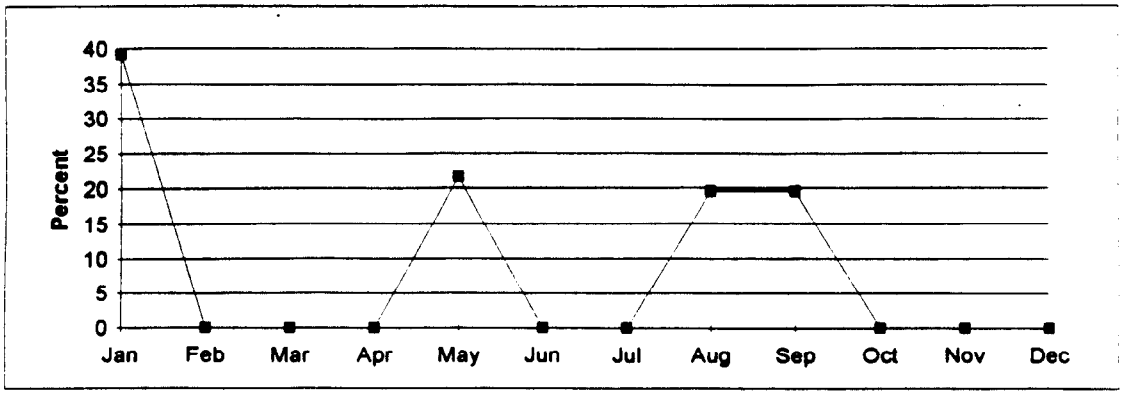
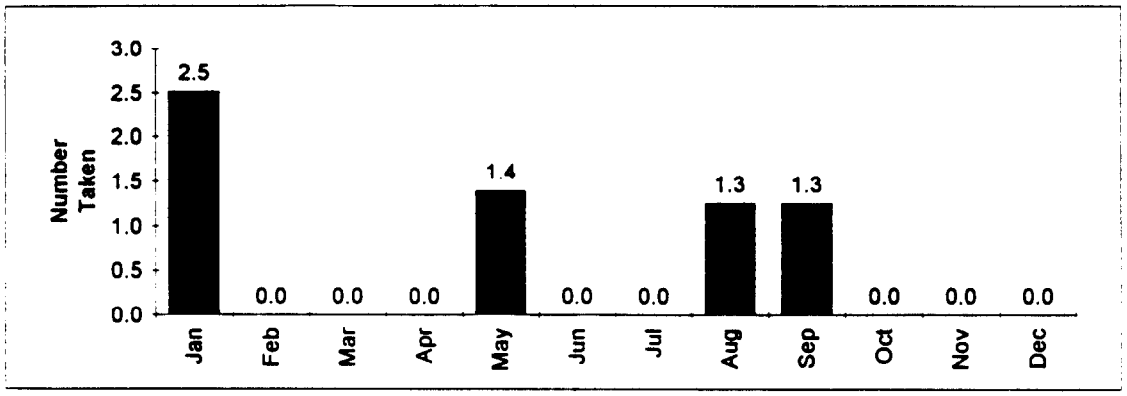
SEA LION (Eumetopias jubatus) TAKE ESTIMATES: SOUTHEAST ALASKA, 1992

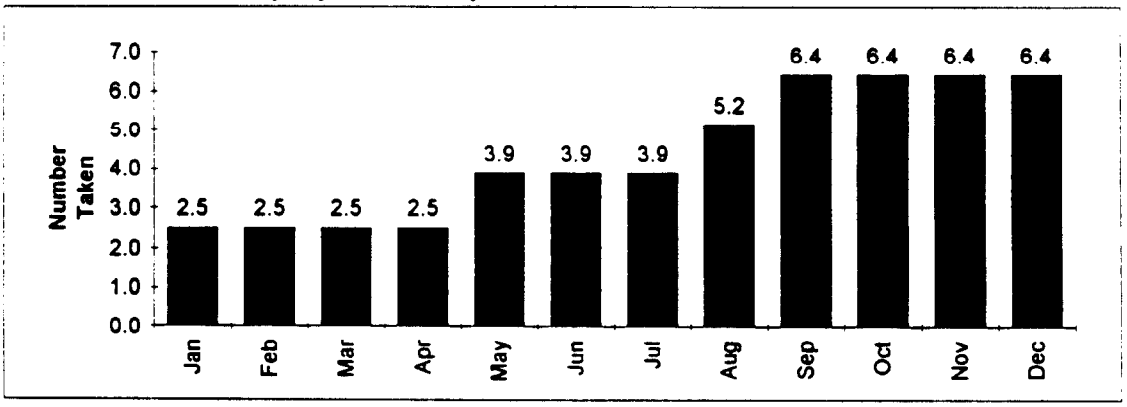
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:24 PM

MMR1SL.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: NORTH PACIFIC RIM, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	31	624	655
Surveyed Households	28	243	271
Sampling Fraction	90.3%	38.9%	41.4%
Sample Household Members	85	777	862
Estimated Household Members	93.5	1879.9	1973.4

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	21.4%
Hunted	5.2%
Harvested	3.3%
Received	20.3%
Gave Away	7.4%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	23.9
Total Number Struck and Lost	6.5
Total Number Taken	30.4
Number Harvested Per Capita	0.01

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	3	1	2	0	2	0	0	1	1	4	2	2	3	21
Struck and Lost	1	1	1	0	0	0	0	0	0	0	1	0	2	6
Total Take	4	2	3	0	2	0	0	1	1	4	3	2	5	27
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	3.3	1.2	2.2	0.0	2.2	0.0	0.0	1.3	1.0	4.6	2.2	2.5	3.3	23.9
Struck and Lost	1.0	1.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	2.1	6.5
Total Take	4.4	2.2	3.4	0.0	2.2	0.0	0.0	1.3	1.0	4.6	3.3	2.5	5.4	30.4
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	4.6	1.7	2.4	0.0	2.4	0.0	0.0	1.3	1.2	4.9	2.9	2.5		23.9
Struck and Lost	2.1	2.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0		6.5
Total Take	6.7	3.8	3.5	0.0	2.4	0.0	0.0	1.3	1.2	4.9	4.1	2.5		30.4
Total Take (%)	22.1%	12.5%	11.6%	0.0%	7.8%	0.0%	0.0%	4.2%	3.9%	16.2%	13.4%	8.3%		100%
Cumulative Take	6.7	10.5	14.0	14.0	16.4	16.4	16.4	17.7	18.9	23.8	27.8	30.4		
Cum. Take (%)	22.1%	34.7%	46.3%	46.3%	54.0%	54.0%	54.0%	58.2%	62.1%	78.3%	91.7%	100.0%		

SEA LION HARVEST BY AGE AND SEX

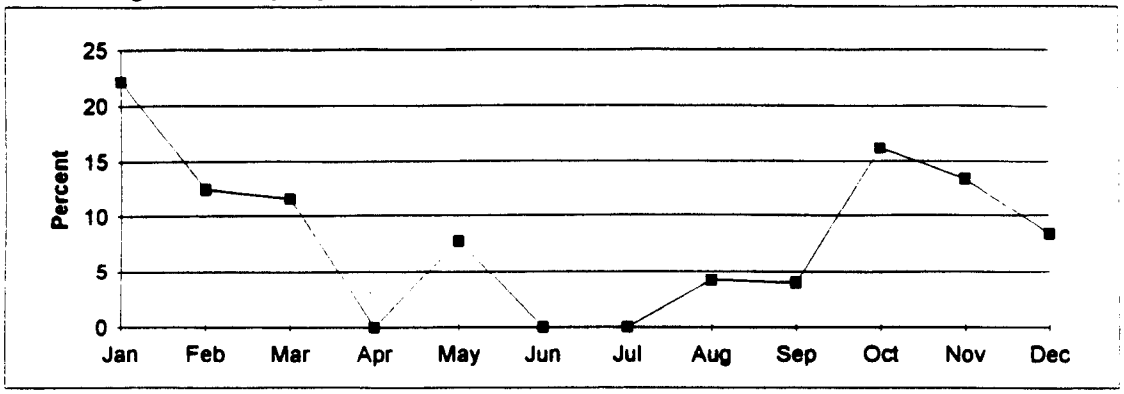
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	4	19.0%	4.3	17.9%
Adult Female	6	28.6%	7.1	29.9%
Adult Unknown Sex	3	14.3%	3.6	15.1%
Juvenile Male	1	4.8%	1.2	4.8%
Juvenile Female	4	19.0%	4.3	17.9%
Juvenile Unknown Sex	0	0.0%	0.0	0.0%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	1	4.8%	1.2	4.8%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	2	9.5%	2.3	9.6%
Total	21	100.0%	23.9	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

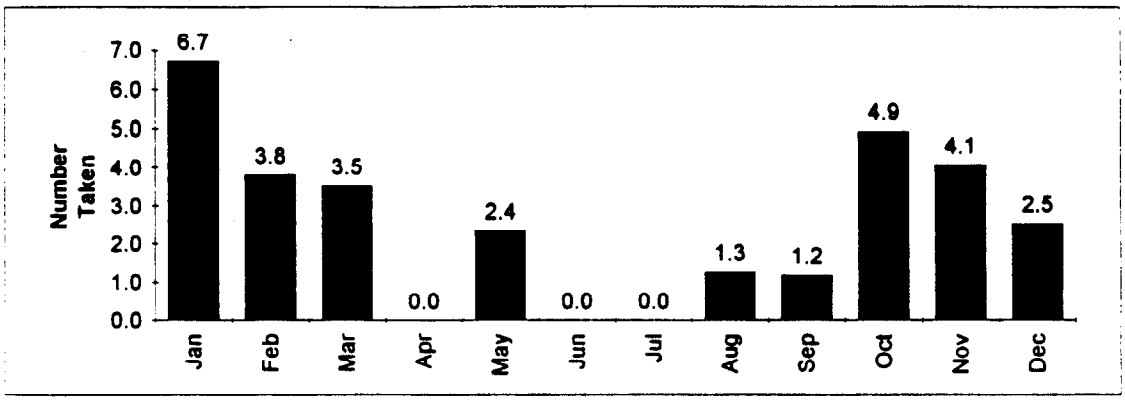
6/28/93 1:24 PM MMR2SL.XLS

SEA LION (Eumetopias jubatus) TAKE ESTIMATES: NORTH PACIFIC RIM, 1992

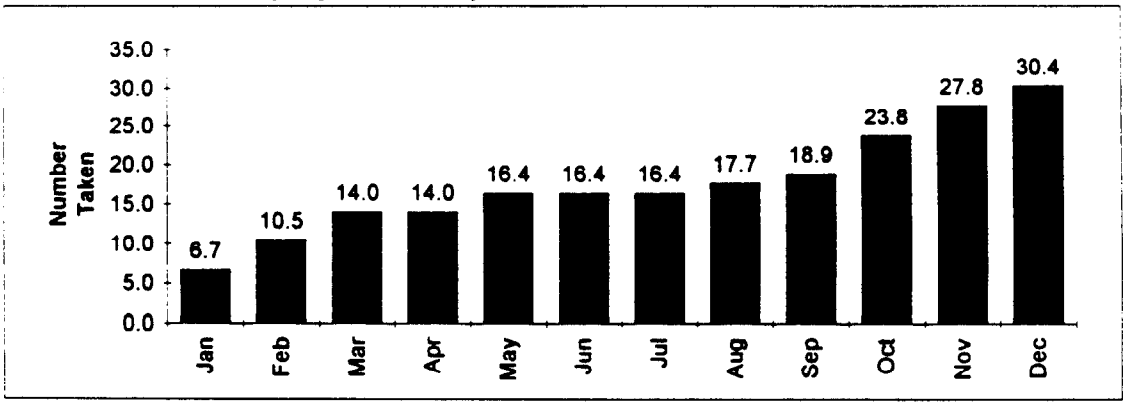
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:24 PM MMR2SL.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: UPPER KENAI - COOK INLET, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	27	53	80
Surveyed Households	16	47	63
Sampling Fraction	59.3%	88.7%	78.8%
Sample Household Members	56	154	210
Estimated Household Members	93.4	173.7	267.0

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	6.3%
Hunted	1.6%
Harvested	1.6%
Received	6.3%
Gave Away	1.6%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	5.7
Total Number Struck and Lost	3.8
Total Number Taken	9.5
Number Harvested Per Capita	0.02

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	0	0	0	0	0	0	0	0	0	3	3
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Total Take	0	0	0	0	0	0	0	0	0	0	0	0	5	5
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	5.7
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.8
Total Take	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	9.5
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		5.7
Struck and Lost	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		3.8
Total Take	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		9.5
Total Take (%)	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%		100%
Cumulative Take	0.8	1.6	2.4	3.2	4.0	4.8	5.5	6.3	7.1	7.9	8.7	9.5		
Cum. Take (%)	8.3%	16.7%	25.0%	33.3%	41.7%	50.0%	58.3%	66.7%	75.0%	83.3%	91.7%	100.0%		

SEA LION HARVEST BY AGE AND SEX

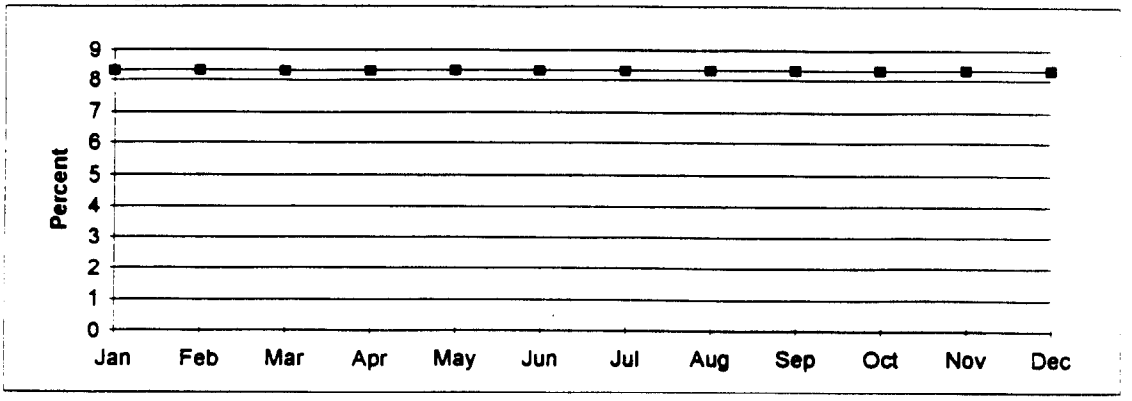
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	0	0.0%	0.0	0.0%
Adult Female	2	66.7%	3.8	66.7%
Adult Unknown Sex	0	0.0%	0.0	0.0%
Juvenile Male	0	0.0%	0.0	0.0%
Juvenile Female	1	33.3%	1.9	33.3%
Juvenile Unknown Sex	0	0.0%	0.0	0.0%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	0	0.0%	0.0	0.0%
Total	3	100.0%	5.7	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

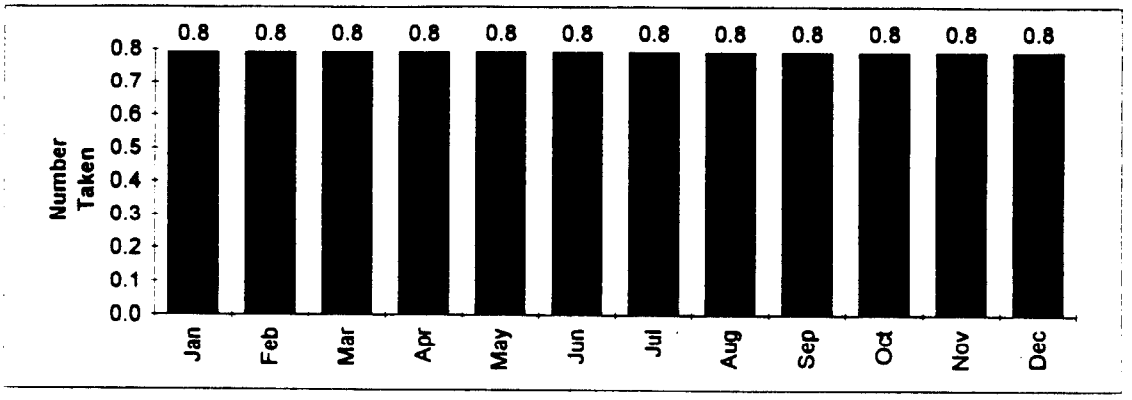
6/29/93 1:29 PM MMR3SL.XLS

SEA LION (Eumetopias jubatus) TAKE ESTIMATES: UPPER KENAI - COOK INLET, 1992

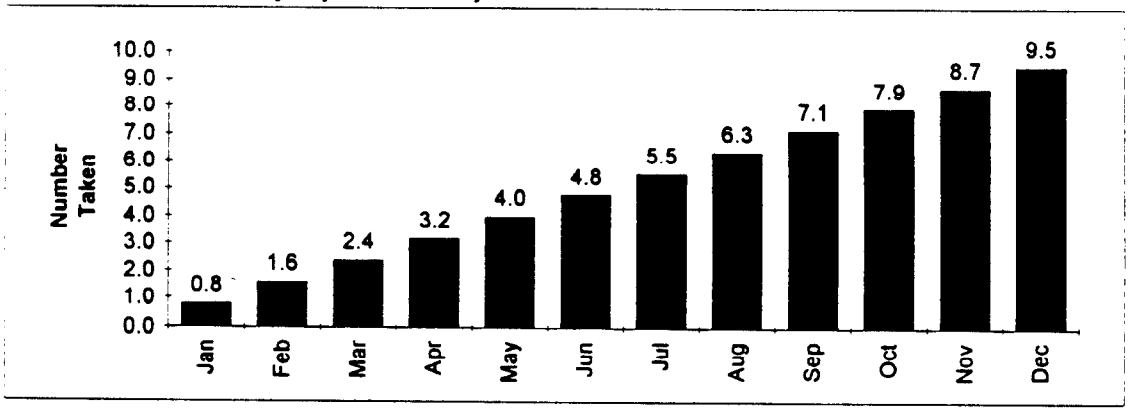
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/29/93 1:29 PM

MMR3SL.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: KODIAK ISLAND, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	117	466	583
Surveyed Households	99	198	297
Sampling Fraction	84.6%	42.5%	50.9%
Sample Household Members	341	624	965
Estimated Household Members	407.1	1290.2	1697.3

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	22.6%
Hunted	9.1%
Harvested	5.7%
Received	19.2%
Gave Away	8.1%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	41.5
Total Number Struck and Lost	16.3
Total Number Taken	57.8
Number Harvested Per Capita	0.02

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	4	0	4	1	2	0	1	0	2	2	2	4	11	33
Struck and Lost	3	0	1	0	0	0	0	0	0	0	1	0	8	13
Total Take	7	0	5	1	2	0	1	0	2	2	3	4	19	46
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	5.3	0.0	5.0	1.0	2.3	0.0	1.3	0.0	2.6	2.4	2.5	4.6	14.5	41.5
Struck and Lost	3.6	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	10.5	16.3
Total Take	8.9	0.0	6.1	1.0	2.3	0.0	1.3	0.0	2.6	2.4	3.5	4.6	25.0	57.8
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	9.4	0.0	8.1	1.0	2.3	0.0	2.3	0.0	4.7	3.4	3.5	6.7		41.5
Struck and Lost	14.2	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0		16.3
Total Take	23.6	0.0	9.2	1.0	2.3	0.0	2.3	0.0	4.7	3.4	4.6	6.7		57.8
Total Take (%)	40.7%	0.0%	15.9%	1.7%	4.0%	0.0%	4.1%	0.0%	8.1%	5.9%	7.9%	11.6%		100%
Cumulative Take	23.6	23.6	32.8	33.8	36.1	36.1	38.4	38.4	43.1	46.6	51.1	57.8		
Cum. Take (%)	40.7%	40.7%	56.7%	58.4%	62.4%	62.4%	66.4%	66.4%	74.6%	80.5%	88.4%	100.0%		

SEA LION HARVEST BY AGE AND SEX

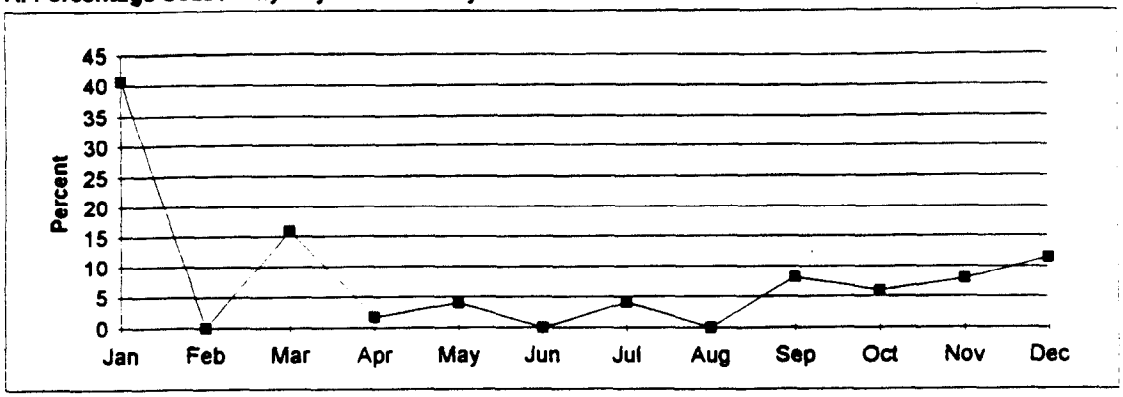
	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	7	21.2%	8.5	20.5%
Adult Female	3	9.1%	3.9	9.5%
Adult Unknown Sex	4	12.1%	4.4	10.6%
Juvenile Male	4	12.1%	5.1	12.3%
Juvenile Female	3	9.1%	3.8	9.1%
Juvenile Unknown Sex	9	27.3%	11.8	28.5%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	3	9.1%	3.9	9.5%
Total	33	100.0%	41.5	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

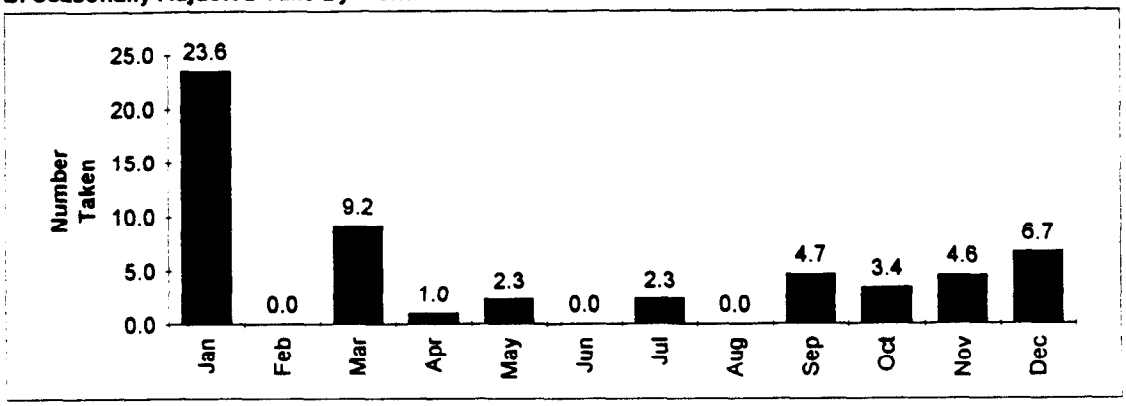
6/28/93 1:28 PM MMR4SL.XLS

SEA LION (*Eumetopias jubatus*) TAKE ESTIMATES: KODIAK ISLAND, 1992

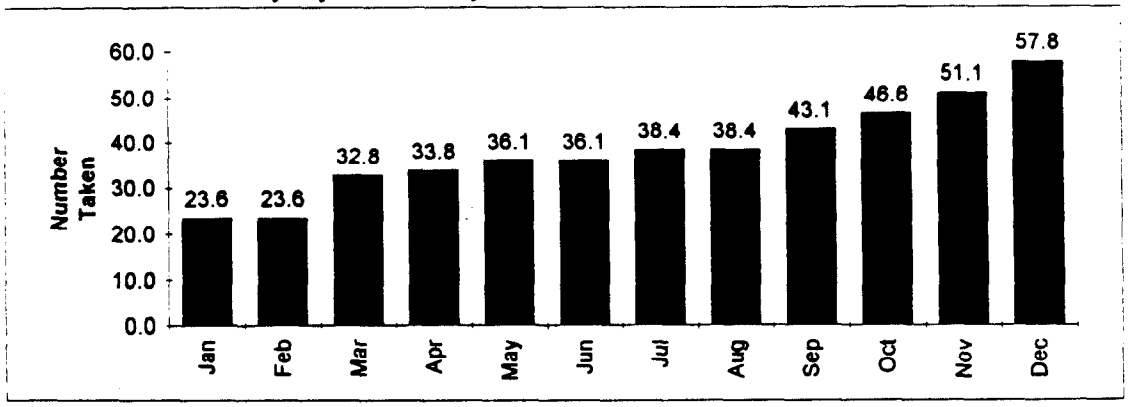
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:28 PM

MMR4SL.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: SOUTH ALASKA PENINSULA, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	32	407	439
Surveyed Households	20	285	305
Sampling Fraction	62.5%	70.0%	69.5%
Sample Household Members	77	978	1055
Estimated Household Members	123.6	1397.6	1521.2

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	3.3%
Hunted	2.3%
Harvested	0.7%
Received	3.0%
Gave Away	1.6%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	2.4
Total Number Struck and Lost	0.0
Total Number Taken	2.4
Number Harvested Per Capita	0.00

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	0	1	0	0	0	1	0	0	0	0	2
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Take	0	0	0	0	1	0	0	0	1	0	0	0	0	2
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	2.4
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Take	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	2.4
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0		2.4
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0		2.4
Total Take (%)	0.0%	0.0%	0.0%	0.0%	45.5%	0.0%	0.0%	0.0%	54.5%	0.0%	0.0%	0.0%		100%
Cumulative Take	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	2.4	2.4	2.4	2.4		
Cum. Take (%)	0.0%	0.0%	0.0%	0.0%	45.5%	45.5%	45.5%	45.5%	100.0%	100.0%	100.0%	100.0%		

SEA LION HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	0	0.0%	0.0	0.0%
Adult Female	0	0.0%	0.0	0.0%
Adult Unknown Sex	1	50.0%	1.3	54.5%
Juvenile Male	1	50.0%	1.1	45.5%
Juvenile Female	0	0.0%	0.0	0.0%
Juvenile Unknown Sex	0	0.0%	0.0	0.0%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	0	0.0%	0.0	0.0%
Total	2	100.0%	2.4	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:32 PM

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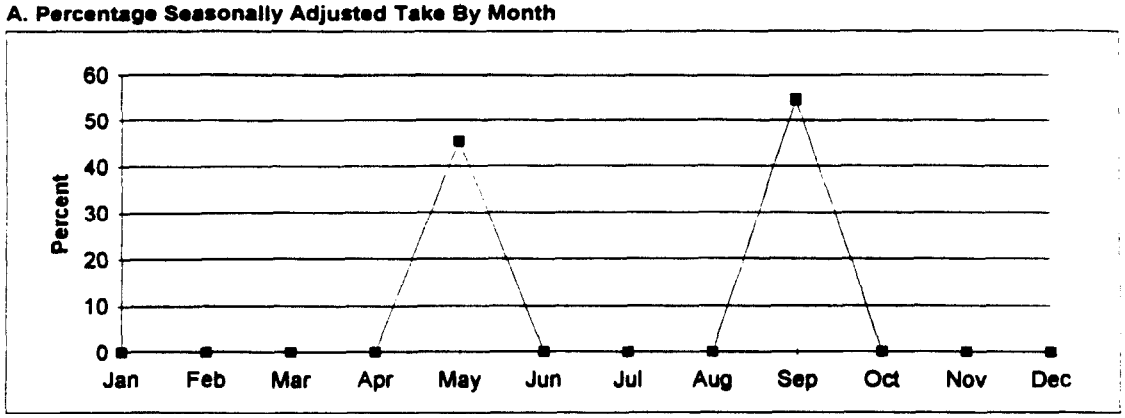
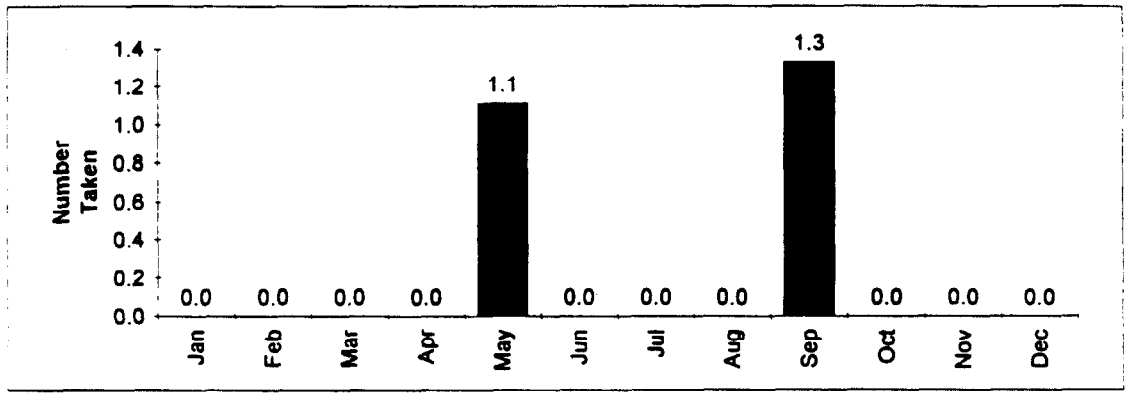
SEA LION (Eumetopias jubatus) TAKE ESTIMATES: SOUTH ALASKA PENINSULA, 1992

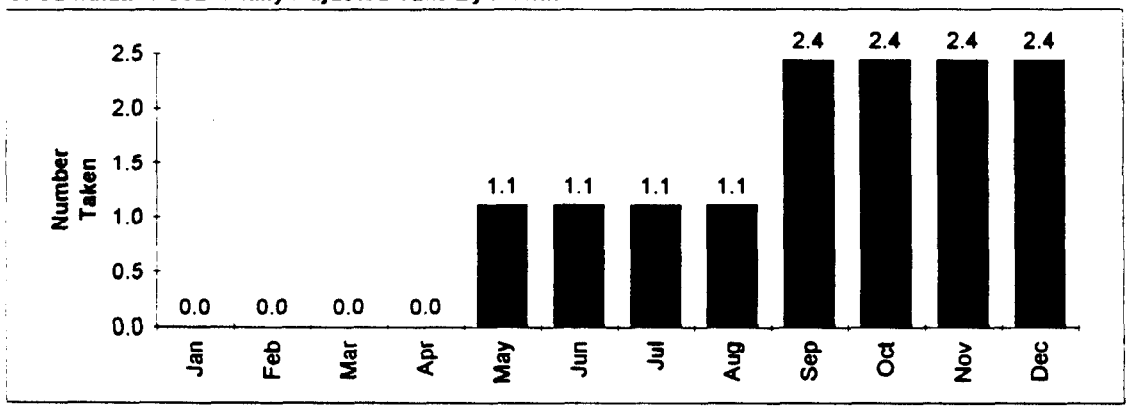
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:32 PM MMR5SL.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: ALEUTIAN - PRIBILOF ISLANDS, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	87	234	321
Surveyed Households	74	165	239
Sampling Fraction	85.1%	70.5%	74.5%
Sample Household Members	299	522	821
Estimated Household Members	350.1	758.6	1108.6

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	81.2%
Hunted	40.2%
Harvested	30.1%
Received	68.2%
Gave Away	40.6%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	280.8
Total Number Struck and Lost	151.1
Total Number Taken	431.9
Number Harvested Per Capita	0.25

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	9	9	12	13	12	6	7	9	30	34	10	14	65	230
Struck and Lost	6	9	11	6	2	3	3	0	7	9	9	5	51	121
Total Take	15	18	23	19	14	9	10	9	37	43	19	19	116	351
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	12.6	10.3	13.8	14.9	14.4	7.1	8.0	10.6	34.6	41.2	12.9	16.4	84.1	280.8
Struck and Lost	6.9	10.3	12.8	6.9	2.2	3.9	3.9	0.0	8.0	11.6	12.7	5.7	66.3	151.1
Total Take	19.5	20.6	26.6	21.8	16.6	11.0	11.9	10.6	42.6	52.7	25.5	22.1	150.4	431.9
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	16.3	14.0	18.4	21.7	21.1	9.5	9.4	14.8	54.4	58.7	18.0	24.5		280.8
Struck and Lost	13.1	20.3	23.5	14.4	3.1	4.7	4.7	0.0	13.9	19.4	21.7	12.6		151.1
Total Take	29.5	34.3	41.9	36.0	24.1	14.2	14.0	14.8	68.3	78.0	39.7	37.1		431.9
Total Take (%)	6.8%	7.9%	9.7%	8.3%	5.6%	3.3%	3.3%	3.4%	15.8%	18.1%	9.2%	8.6%		100%
Cumulative Take	29.5	63.7	105.7	141.7	165.8	180.0	194.0	208.8	277.1	355.2	394.9	431.9		
Cum. Take (%)	6.8%	14.8%	24.5%	32.8%	38.4%	41.7%	44.9%	48.4%	64.2%	82.2%	91.4%	100.0%		

SEA LION HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	27	11.7%	31.1	11.1%
Adult Female	18	7.8%	20.4	7.3%
Adult Unknown Sex	6	2.6%	7.9	2.8%
Juvenile Male	116	50.4%	141.2	50.3%
Juvenile Female	17	7.4%	19.7	7.0%
Juvenile Unknown Sex	25	10.9%	36.5	13.0%
Pup Male	13	5.7%	14.9	5.3%
Pup Female	1	0.4%	1.1	0.4%
Pup Unknown Sex	4	1.7%	4.6	1.6%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	3	1.3%	3.4	1.2%
Total	230	100.0%	280.8	100.0%

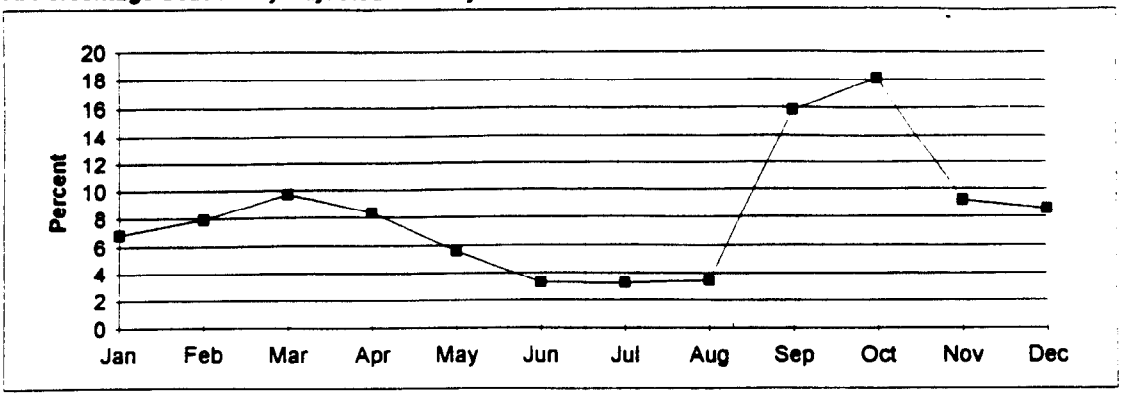
SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:33 PM

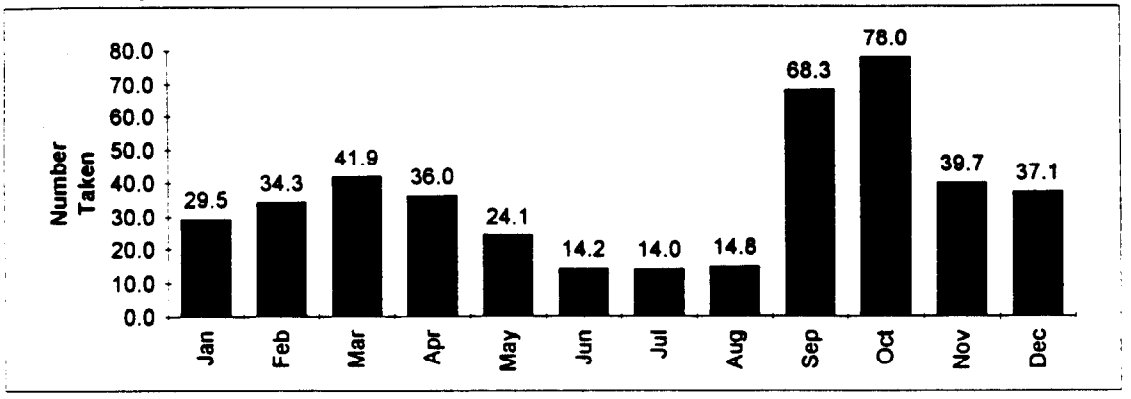
MMR6SL.XLS

SEA LION (Eumetopias jubatus) TAKE ESTIMATES: ALEUTIAN - PRIBILOF ISLANDS, 1992

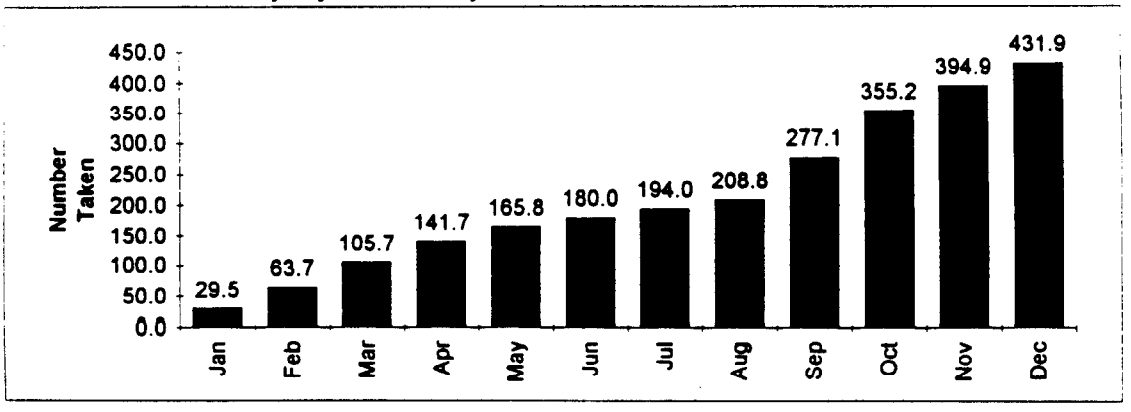
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

6/28/93 1:33 PM

MMR6SL.XLS

SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: SOUTH BRISTOL BAY, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	18	264	282
Surveyed Households	18	180	198
Sampling Fraction	100.0%	68.2%	70.2%
Sample Household Members	67	558	625
Estimated Household Members	67.0	820.5	887.5

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	0.5%
Hunted	0.0%
Harvested	0.0%
Received	0.5%
Gave Away	0.0%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	0.0
Total Number Struck and Lost	0.0
Total Number Taken	0.0
Number Harvested Per Capita	0.00

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Take	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Take	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take (%)	—	—	—	—	—	—	—	—	—	—	—	—		—
Cumulative Take	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Cum. Take (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		

SEA LION HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	0	—	0.0	—
Adult Female	0	—	0.0	—
Adult Unknown Sex	0	—	0.0	—
Juvenile Male	0	—	0.0	—
Juvenile Female	0	—	0.0	—
Juvenile Unknown Sex	0	—	0.0	—
Pup Male	0	—	0.0	—
Pup Female	0	—	0.0	—
Pup Unknown Sex	0	—	0.0	—
Male Unknown Age	0	—	0.0	—
Female Unknown Age	0	—	0.0	—
Unknown Sex and Age	0	—	0.0	—
Total	0	—	0.0	—

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

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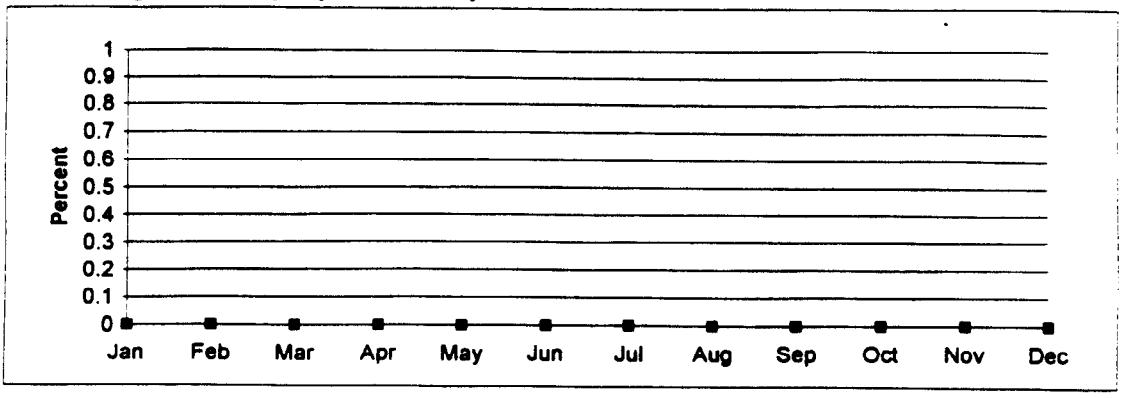
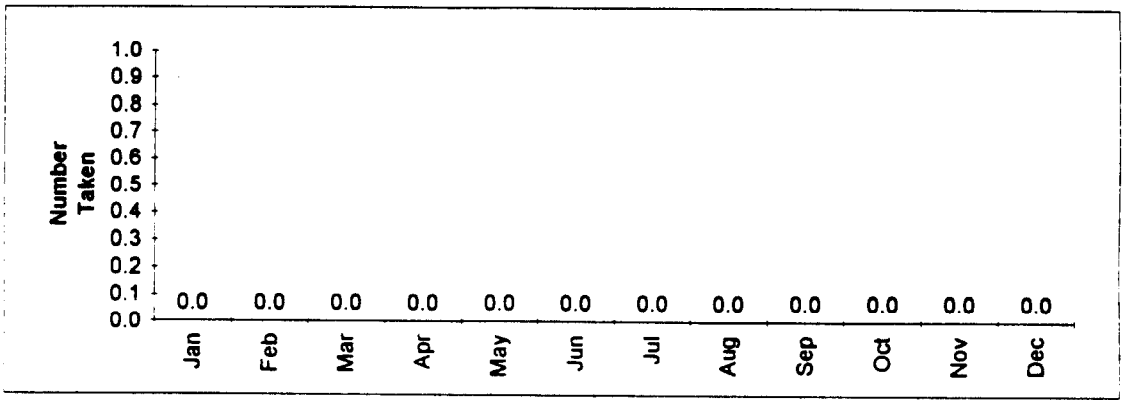
SEA LION (Eumetopias jubatus) TAKE ESTIMATES: SOUTH BRISTOL BAY, 1992

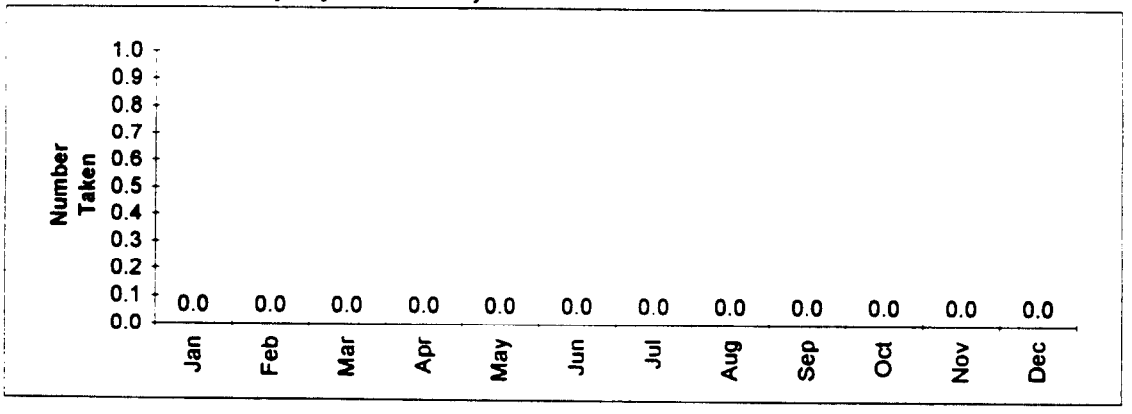
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

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SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

SAMPLING DESIGN: MIXED

	Active	Other	Total
Total Native Households	102	610	712
Surveyed Households	77	139	216
Sampling Fraction	75.5%	22.8%	30.3%
Sample Household Members	374	533	907
Estimated Household Members	500.0	2132.3	2632.2

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	16.7%
Hunted	3.7%
Harvested	1.9%
Received	16.2%
Gave Away	6.0%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	7.8
Total Number Struck and Lost	0.0
Total Number Taken	7.8
Number Harvested Per Capita	0.00

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	1	4	0	0	0	0	0	0	0	0	5
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Take	0	0	0	1	4	0	0	0	0	0	0	0	0	5
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	1.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Take	0.0	0.0	0.0	1.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	1.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0		7.8
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take	0.0	0.0	0.0	1.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0		7.8
Total Take (%)	0.0%	0.0%	0.0%	12.9%	87.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		100%
Cumulative Take	0.0	0.0	0.0	1.0	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8		
Cum. Take (%)	0.0%	0.0%	0.0%	12.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		

SEA LION HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	1	20.0%	1.0	12.9%
Adult Female	0	0.0%	0.0	0.0%
Adult Unknown Sex	0	0.0%	0.0	0.0%
Juvenile Male	3	60.0%	5.8	74.3%
Juvenile Female	0	0.0%	0.0	0.0%
Juvenile Unknown Sex	0	0.0%	0.0	0.0%
Pup Male	1	20.0%	1.0	12.9%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	0	0.0%	0.0	0.0%
Total	5	100.0%	7.8	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

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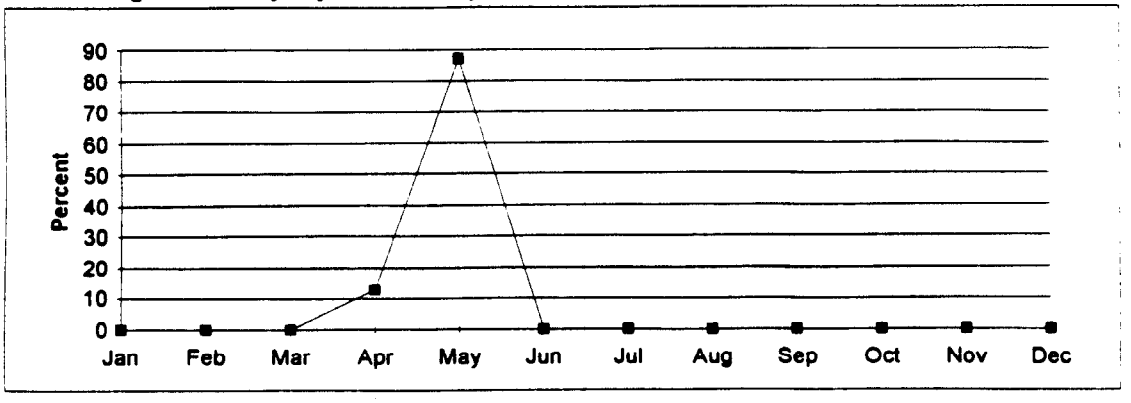
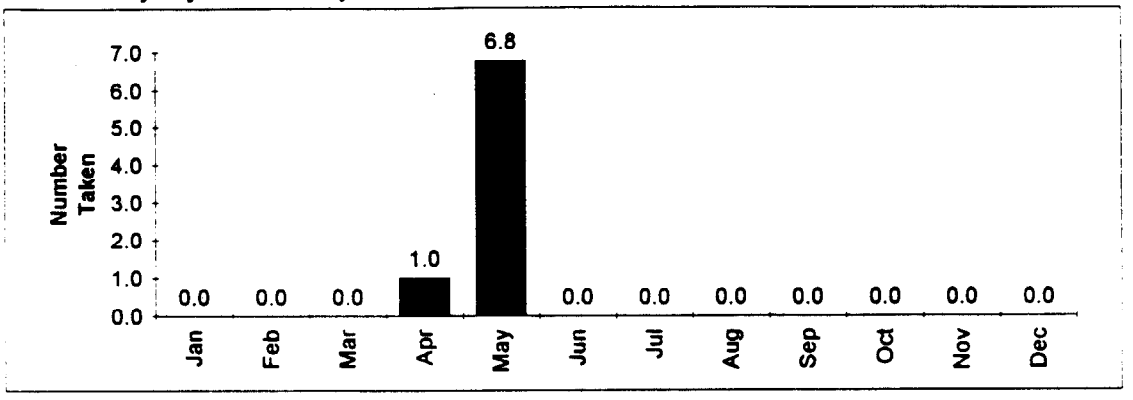
SEA LION (Eumetopias jubatus) TAKE ESTIMATES: NORTH BRISTOL BAY, 1992

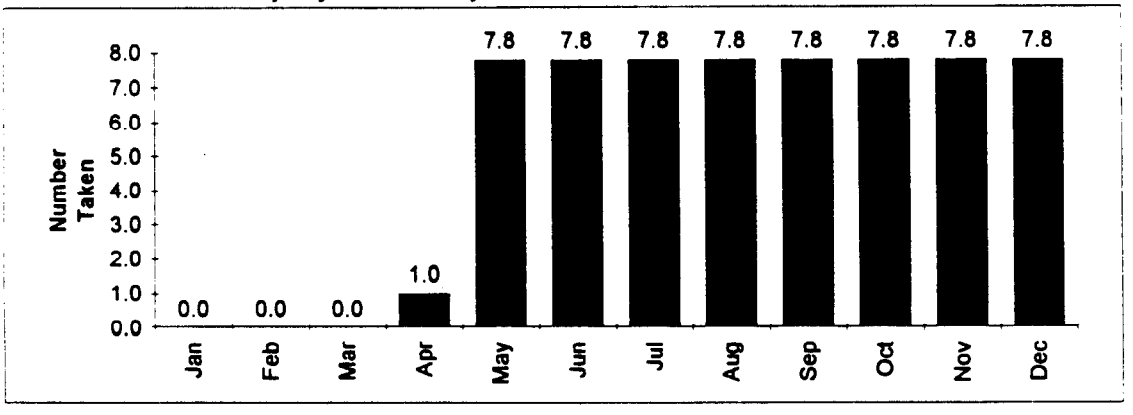
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

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SEA LION (Eumetopias jubatus) HARVEST AND TAKE ESTIMATES: LAKE ILIAMNA, 1992

SAMPLING DESIGN: MIXED

Total Native Households	52
Surveyed Households	41
Sampling Fraction	78.8%
Sample Household Members	187
Estimated Household Members	236.2

SEA LION HARVEST AND USE INFORMATION

Percent Of Native Households:

Used	2.4%
Hunted	2.4%
Harvested	2.4%
Received	0.0%
Gave Away	2.4%

Estimated Community Harvest and Take (Expanded):

Total Number Harvested	1.3
Total Number Struck and Lost	0.0
Total Number Taken	1.3
Number Harvested Per Capita	0.01

SEA LION HARVEST BY SEASON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown Month	Total
REPORTED HARVEST BY SAMPLED HOUSEHOLDS (UNEXPANDED)														
Harvest	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Struck and Lost	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Take	0	0	0	0	0	0	0	0	0	0	0	0	1	1
ESTIMATED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Take	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3
ESTIMATED SEASONALLY ADJUSTED HARVEST BY COMMUNITY (EXPANDED)														
Harvest	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		1.3
Struck and Lost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Take	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		1.3
Total Take (%)	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%		100%
Cumulative Take	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3		
Cum. Take (%)	8.3%	16.7%	25.0%	33.3%	41.7%	50.0%	58.3%	66.7%	75.0%	83.3%	91.7%	100.0%		

SEA LION HARVEST BY AGE AND SEX

	Reported By Sample (Unexpanded)	Percent	Estimated By Community (Expanded)	Percent
Adult Male	0	0.0%	0.0	0.0%
Adult Female	0	0.0%	0.0	0.0%
Adult Unknown Sex	0	0.0%	0.0	0.0%
Juvenile Male	0	0.0%	0.0	0.0%
Juvenile Female	0	0.0%	0.0	0.0%
Juvenile Unknown Sex	0	0.0%	0.0	0.0%
Pup Male	0	0.0%	0.0	0.0%
Pup Female	0	0.0%	0.0	0.0%
Pup Unknown Sex	0	0.0%	0.0	0.0%
Male Unknown Age	0	0.0%	0.0	0.0%
Female Unknown Age	0	0.0%	0.0	0.0%
Unknown Sex and Age	1	100.0%	1.3	100.0%
Total	1	100.0%	1.3	100.0%

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

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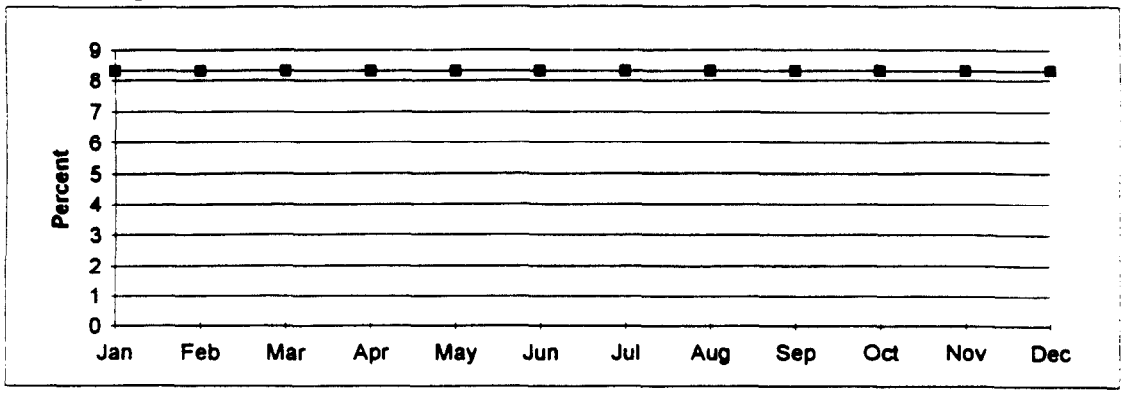
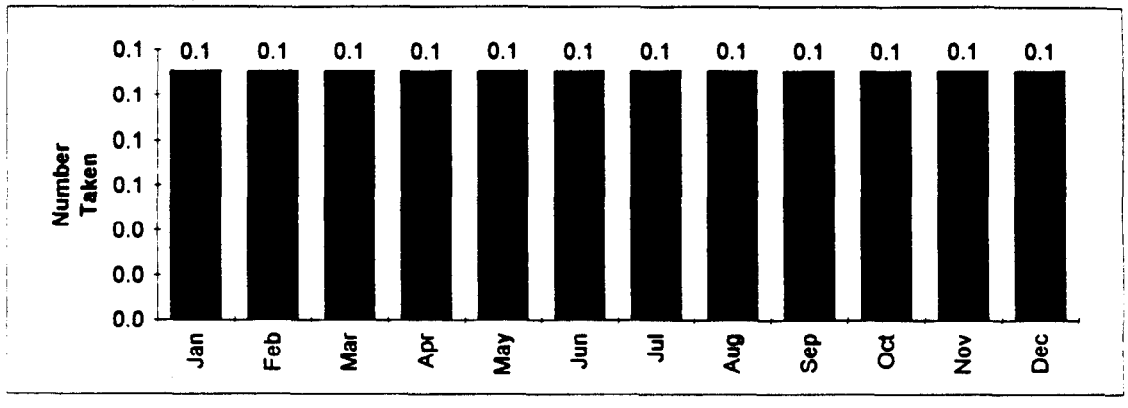
SEA LION (Eumetopias jubatus) TAKE ESTIMATES: LAKE ILIAMNA, 1992

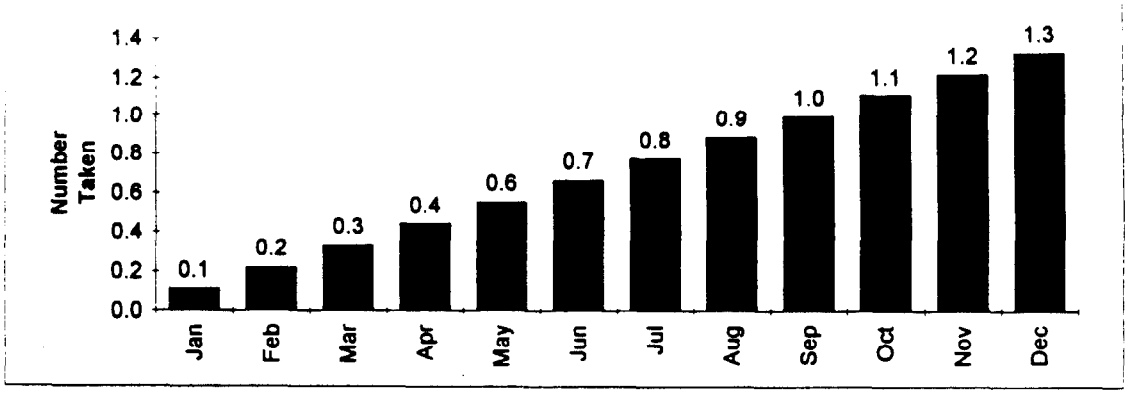
A. Percentage Seasonally Adjusted Take By Month



B. Seasonally Adjusted Take By Month



C. Cumulative Seasonally Adjusted Take By Month



SOURCE: Alaska Department of Fish and Game, Division of Subsistence, Subsistence Study and Monitor System for Sea Lions and Harbor Seals in Alaska.

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ADDENDUM TO APPENDIX B

HISTORY OF THE HAIR SEAL BOUNTY AND PREDATOR CONTROL PROGRAMS IN ALASKA

BY AMY W. PAIGE

The Subsistence Harvest of Harbor Seal and Seal Lion by Alaska Natives in 1992, by Robert J. Wolfe, et al, Division of Subsistence, Alaska Department of Fish and Game, Juneau, Alaska, July 1993. Final Report For Year One, Subsistence Study and Monitor System (No. 50ABNF200055), Prepared for the National Marine Fisheries Service.

ADDENDUM TO APPENDIX B

History of the Hair Seal Bounty and Predator Control Programs in Alaska

By Amy W. Paige

Early wildlife management techniques in territorial Alaska included use of a system of direct bounty payments to hunters for killing certain predator animals, as a method of controlling predation on valued game stocks. Wolves and coyotes were the primary targets of bounty programs in Alaska intended to protect reindeer and domestic stocks. Under the Bureau of Biological Survey, and its successor agency, the federal Fish and Wildlife Service, these management tools were introduced to Alaska.

With the salmon industry experiencing a decline, the search for solutions included efforts to control non-human predation on salmon. Animal species considered predators of fish and included on the bounty list at various times included bald eagles (1917-53), Dolly Varden char (1931-41), and hair seals (1927-1972). Sea lions and beluga whales were also considered a problem for the salmon fishing industry, although they were not included in the bounty program,

At the start of the hair seal bounty program in 1927 the bounty applied to all hair seals in the coastal waters of the southern coast east from Kodiak Island (the 152nd meridian), an area which coincided roughly with the range of the harbor seal (*Phoca vitulina richardsi*). Table 1 summarizes the information on the hair seal bounty program, collated from the several departmental annual and program reports.[1] The number of seals bountied in these Southeast and Gulf coast waters rose from 5,105 in the first two-year period of the program to almost 16,250 in the biennium 1933-34 (for an annual average of 8,125). Since the waters of the First and Third judicial divisions correspond well with the range of the harbor seal, for the purposes of this review we have considered seals bountied for these areas to be harbor seals, while bounties claimed from the Second and Fourth judicial divisions most likely represent a mix of spotted, ringed, ribbon and bearded seals. The addition of the Bering Sea including the waters of Bristol Bay and Golovin Bay to the bounty area in 1935 does not seem to have had a major affect on number of bountied seals. However, when the bounty area was expanded in 1949 to include all Alaska coastal waters from Dixon Entrance in the south to Demarcation Point in the far northeast, combined with a rise in the bounty rate from $3 to $6, the bounty records show a

[1] For the period 1927 through 1958 data is for two-year periods. Data for biennium 1957-58 actually represents two and a half years of the program, since extra appropriations were made to cover the period through June 30, 1959. Thereafter, a fiscal year accounting plan was adopted by the Legislature, with a July 1 starting date and a June 30 end date.

dramatic increase in number of hair seals bountied to 49,532, for the two year period 1949-50 (annual average of 24,766). Almost half of that was reported from the area north of Cape Newenham, in the 2nd and 4th judicial divisions, and likely included such hair seal species as ribbon (*Phoca fasciata*), ringed (*Phoca hispida*), spotted *(Phoca largha)* and bearded seals (*Erignathus barbatus*).

The bounty rate was reduced back to $3 in 1951, and at the same time the bounty area was reduced to the waters east of the 152 meridian, Bristol Bay, and coastal waters from Stebbins to Cape Krusenstern. The records show continued high numbers of bountied hair seals for the biennium 1951-52. Between 1951 and 1962 the numbers continued between 12,000 and 16,000 per year. Then in 1962, the bounty area was again extended to cover all inland and coastal waters of Alaska. Thereafter, the estimated number of hair seals bountied jumped from approximately 38,500 in FY 1963-64 to 50,000 in FY 1964-65, and climbed to 70,462 in FY 1965-66. This also corresponds with a significant growth in the commercial market for hair seals. Then in July 1967 legislation to restrict the bounty area to Bering and Chukchi seas and the Arctic Ocean was passed. Thereafter, the number of seals reported for bounty declined sharply to 13,634 in FY 1966-67, and to just half of that (7,147) in the following year. By FY 1971-72 there were reported 3,029 hair seals bountied, with harvests most likely from the western and northwestern areas where the bounty still applied. Actual estimated harvests of hair seals for subsistence uses from those western and northwestern/arctic areas were much higher, put at approximately 17,600 in calendar year 1969, 17,500 in 1970, and 13,500 in FY 1971 (Burns, 1972, 1973). No comparable estimates have been found for subsistence harvest levels of hair seals in the range of the harbor seal.

During the mid 1960s there was a significant growth in the commercial market for seal skins, including the several hair seal species. The price hunters could get for raw hides rose from a low of $2 - $3 to $20 for an average quality hide, and even as high as $40-50 for high quality skins. The market prices paid for hair seal skins reached its peak in 1965, decreasing in subsequent years, along with a decrease in reported harvest. The decline in hair seal prices, combined with the reduction in the area in which seals could be bountied, resulted in a dramatic decline in the number of seals bountied and state expenditures dropped from $211,386 in FY 1965-66 to $9,087 by 1972. In that year the Marine Mammal Protection Act went into effect and stopped all hunting of marine mammals, with the notable exception of harvests by Alaska Natives for subsistence purposes.

Concomitantly, in the period 1950-1959, the Alaska Department of Fish and Game carried out a predator control program on hair seals in three locations in southeast and southcentral Alaska, where predation by hair seals on local salmon fisheries was considered to be causing substantial economic losses justifying more drastic measures than the bounty program. Table 2 summarizes the information available on this predator control program. Altogether the Territory expended $313,457 over a nine-year period to destroy some 38,444 hair seals on the Stikine, Taku and Copper rivers. On the Stikine and Taku rivers, sharp shooters where hired to shoot seal just before and during the prime salmon gill-net fishing period. On the Copper River delta, the control program consisted of detonating dynamite depth bombs over a wide area after the salmon fishing season at times when the seals were occupying haulouts. This program was initiated with little scientific understanding of the relationship between hair seals, salmon, and their shared marine environment. In the first years of the program, most seals destroyed were not retrieved for study of feeding habits. Complaints of fishermen and fish processors were sufficient to justify the program. By 1957, however, biological investigations were showing that seals prey on other fish as well as salmon, such as flatfish and cod, which are known to be predators on young salmon. "Thus far, it seems that the more information one obtains, the more complicated the seal problem becomes" (Annual Report, 1957, p. 53).

While there is no explicit identification of hair seal species involved in the predator control program, the area of focus of these activities in the range of the harbor seal make it likely that it was the harbor seal that was the target of these predator control actions.

By the mid 1950s both the bounty program and the predator control program were being re-evaluated. The benefits of hair seal and other marine mammals to the people of western Alaska, as sources of subsistence foods were noted. Also the dangers that reduction of predators would result in upsetting the natural balances were acknowledged. Biological investigations of the feeding habits of seals, as well as assessment of the predator control programs' effect on the salmon fishery it was designed to enhance, suggested that methods involving the "least destructive of animal life having natural or other values" be employed. (Annual Report, 1956, p. 50) Field investigations were bringing more information to bear on the factors affecting recovery of the salmon fisheries, including the beneficial role of seals as predators of other fish species, such as tom cod, which prey on young salmon. Lensink notes that the ringed and bearded seals bountied in northern waters "do not prey extensively on fish of any kind." [2]

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[2] ADFG 1958 Annual Report No. 10, Lensink, "Predator Control and Investigations", p. 98.

As noted above, the area in which the bounty on hair seal applied was alternately expanded and reduced. Wildlife managers began to question the effectiveness of bounty programs in dealing with specific economic impacts of predators on commercially valuable wildlife stocks in general, and of hair seals on gill-net salmon fisheries of southeast and southcentral Alaska specifically, although it was still seen by some as contributing to the economic welfare of people in villages of western and northwestern Alaska. Department biologist Calvin Lensink evaluated the hair seal bounty program's effectiveness as a means of distributing welfare payments, and showed that the "largest payments go to professional hunters least in need of welfare." [3] Lensink summarized the findings about the bounty system as

> ....at best, ...ineffective and wasteful in that it does not provide satisfactory control of predation where it is needed, the distribution of payments is such that most do not go to those persons or communities which are most in need, and that the bulk of payments are for animals taken in areas where control is not essential. At its worst, ...the animals which may have value in themselves are wastefully destroyed, and ...in certain situations the destruction of predators may be harmful to the very animals that we are trying to protect.[4]

In spite of arguments to end the bounty program, it was retained in parts of the state until 1971, although the Department's predator control program was ended in 1959.

With a couple of exceptions, data on the hair seal bounty program as reported in the Alaska Department of Fish and Game's annual reports do not distinguish the several hair seal species, or the areas from which bountied seals were harvested. Marine mammal reports of the early 1970s provide data for the later years of the bounty program in western and northwestern Alaska on the species composition of the harvest, by village. However these data are on a calendar year basis, difficult to correlate with appropriations and expenditure data available from the other sources. The ADFG Annual Report for 1952 provides data for three biennia starting in 1947 by judicial districts. These data have been incorporated into Table 2. It does not account for the total appropriations reported for those years in other sources however. Information on species and area of harvest may be available in original department records of the bounty programs.

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[3] *Op.cit.*, p. 96
[4] *Op.cit.*, p. 99

Table 1. Bountied Hair Seals and Expenditures for Claims, 1927-1972

Biennium	Boun Rate	Total Appro-priated	Total Expended	Estimated Number of Seals Bountied [1] Southeast 1st Division	Central/ Southwest 3rd Division	Arctic/ Western 2nd & 4th Div.	Un-known Area	Estimated Nos. Seals Bountied
1927-28 [2][4]	$2	$20,000	$14,964	4912	193		2360	7,465
1929-30	$2	$18,000	$17,462	7879	843			8,722
1931-32	$2	$27,500	$27,498	12339	1385			13,724
1933-34	$2	$32,000	$32,495	13849	2399			16,248
1935-36[3]	$2	$40,000	$39,930	13600	6068	297		19,965
1937-38	$2	$40,000	$40,000	13468	6046	486		20,000
1939-40	$3	$80,000	$80,000	16945	9091	630		26,666
1941-42 [4]	$3	$80,000	$60,000	10241	4603	1161	3995	20,000
1943-44 [4]	$3	$60,000					16666	16,666
1945-46 [4]	$3	$50,000					16666	16,666
1947-48 [5]	$3	$50,969	$50,969	6985	5292	153	4559	16,989
1949-50 [6]	$6	$298,000	$297,192	12219	12582	24731		49,532
1951-52 [5][7]	$3	$118,108	$118,108	5137	2741	9344	22147	39,369
1953-54	$3	$72,500					24166	24,166
1955-56	$3	$72,500					24166	24,166
1957-58 [8]	$3	$118,115					39705	39,705
Fiscal Year								
1959-60	$3	$43,923	$43,923				14641	14,641
1960-61	$3	$40,188	$40,188				13396	13,396
1961-62	$3	$46,911	$46,911				15637	15,637
1962-63[9]	$3	$71,364	$71,364				23788	23,788
1963-64	$3	$115,413	$115,413				38471	38,471
1964-65	$3	$155,025	$155,025				51675	51,675
1965-66	$3	$211,386	$211,386				70462	70,462
1966-67[10]	$3	$40,902	$40,902			13634		13,634
1967-68	$3	$21,442	$21,442			7147		7,147
1968-69	$3	$14,905	$14,905			4968		4,968
1969-70	$3							
1970-71	$3	$17,328	$17,328			5776		5,776
1971-72	$3	$9,087	$9,087			3029		3,029
TOTAL 1927-1972		**1,965,566**						**622,673**

[1] Estimates for biennia 1927-28 through 1941-42 based on biennial expenditures by judicial division, including regular, carry-over or deficiency appropriations, as reported in Territorial Treasurer's reports. Territorial Reports for years 1943-44 and late were not available. Total appropriations for these years and for subsequent years through fiscal year 1963-64 found in ADFG Hair Seal Status Report, provided the basis for estimating total numbers of seals bountied. Where the regular appropriation was not entirely used, the following appropppriation, if smaller was used as a basis for the estimate. Geographical distribution for a portion of claims paid in 1947-48, 1949-50 and portion of 1951-52 found in ADFG 1952 Annual Report No. 4. Estimates for fiscal years 1964-65 through 1971-72 are found in ADFG, Division of Game, McKnight, Donald E., The History of Predator Control in Alaska, Feb. 1973.

[2] SLA 1927, Chap. 48, established bounty on "every hair seal inhabiting the island waters and all waters adjacent to the southern coast of Alaska and east of the 152nd meridian." [Coastal waters east of Kodiak Island.]

[3] SLA 1935, Chap. 62 Area considered the same as above with the addition of the "waters of Bering Sea and of Golovin Bay lying within a line drawn from the tip of Rocky Point to the tip of Cape Darby."

[4] Where the regular appropppriation was not entirely used, the following regular appropppriation, if smaller was used as a basis for the estimate

[5] Geographical distribution not available for portion of claims paid, although total expenditures is available.

[6] SLA 1949, Chap. 16, Bounty extended from Dixon Entrance to Demarcation Point [Entire coast of Alaska.]

[7] SLA 1951, Chap. 122. Bounty area reduced to the southern coast east of 152nd meridian, [east of Kodiak Island], the waters of Bristol Bay and within 3 miles of mainland from Stebbins to Cape Kruzenstern, inclusive.

[8] Includes appropriations to cover period through June 30, 1959. Subsequent appropriations are for fiscal years beginning July 1 and ending June 3

[9] SLA 1962, Chap. 35, Bounty extended to cover all seals inhabiting all inland and coastal waters of Alaska.

[10] SLA 1967, Chap. 35. Bounty area covers "the inland and coastal waters of Alaska west of 159 degrees west longitude or north of 69 degrees north latitude, except the waters south of 58 degrees north latitude." [i.e. Bering and Chukchi seas and Arctic Ocean]

Sources:

Territorial Treasurer's Reports, 1927-1942

ADFG, Division of Game. Hair Seal Status Report, December 1964.

ADFG, 1952 Annual Report No. 4, Juneau, AK .

ADFG, Division of Game. Donald E. McKnight, History of Predator Control in Alaska, February 1973.

Table 2. Number of Hair Seals Killed and Alaska Department of Fisheries Expenditures for the Hair Seal Predator Control Program, 1951-59

Year	Stikine	Taku	Copper	Total	Expenditures
1951	946		500	1446	$ 7,408
1952	768	123	6789	7680	$ 49,890
1953	552	355	6799	7706	$ 46,001
1954	491	186	4909	5586	$ 49,743
1955	362	81	3356	3799	$ 39,388
1956	426	60	2100	2586[1]	$ 19,965
1957	396	60	4250	4706	$ 28,062 *
1958	1058	49	1350	2457	$ 48,583 *
1959	1503		975	2478	$ 24,417 *
TOTAL	**6502**	**914**	**31028**	**38444**	**$313,457**

* Includes funds used for predator investigations.
[1] Additional 165 taken in the vicinity of Snettisham Bay and Tracy Arm
Some sea lions were also killed primarily in the Stikine River area, as follows:
1952- 18; 1953-11; 1954-35; 1955-18; 1956-14 (Stikine) and 10 (Taku), total - 106.

Source: Alaska Department of Fish and Game, Annual Reports, 1950-59

Table 3. Number of Hair Seal Bountied and Estimated Hair Seal Harvest from Western and Northwest Alaska, 1962-1972

Year	Bounty Rate	Number of Seals Bountied - Western/Northwestern	Estimated Bounty Payments Western/Northwestern(2)	Estimated Seal Harvest (1)
1961-62	$3	16,550 (3)	$ 49,650	
1962-63	$3	16,500 (3)	$ 49,500	
1963-64	$3	11,800 (3)	$ 35,400	
1964-65	$3	21,015 (4)	$ 63,045	
1965-66	$3			
1966-67	$3			
1967-68	$3			
1968-69	$3			17,590
1970-71	$3	5,184 (5)	$ 15,552	17,540
1971-72	$3	4,691 (1)	$ 14,073	13,525

(1) Estimates based on known seasonal harvests at some villages, reports of interested residents, and estimates by investigators residing in or visiting various villages. Burns, 1972 and 1973
(2) Estimate based on reported number of seals harvested times $3.
(3)ADFG, Marine Mammal Report, Burns, 1966, p. 43.
(4) Approximately divided among the several species of hair seals as follows: ringed seal - 13,590; bearded seal - 33,430; harbor seal - 3,995. Based on random seasonal samples of seal scalps submitted to the Nome office.
(5) Burns, 1972

Source: ADF&G, Division of Game. McKnight, Donald E. History of Predator Control in Alaska, and Burns, John J. Marine Mammal Reports, July 1966 and May 1973

Burns notes that the proportion of harbor seals in the total harvest generally decreases from south to north. (Burns, 1966, p. 43)

Table 4. Bounty Appropriations and Estimated Number of Claims for Hair Seals, 1927-1972

Biennium	Bounty Rate	Regular Appropriation	Deficiency Appropriation	Total Appropriation	Estimated No. of Seals Bountied (5)
1927-28 (1)	$2	$ 20,000		$ 20,000	7,500
1929-30	$2	$ 15,000	$ 3,000	$ 18,000	9,000
1931-32	$2	$ 17,500	$ 10,000	$ 27,500	13,750
1933-34	$2	$ 25,000	$ 7,500	$ 32,000	16,250
1935-36 (2)	$2	$ 30,000	$ 10,000	$ 40,000	19,965
1937-38	$2	$ 40,000		$ 40,000	20,000
1939-40	$3	$ 60,000	$ 20,000	$ 80,000	26,666
1941-42	$3	$ 80,000		$ 80,000	20,000
1943-44	$3	$ 60,000		$ 60,000	16,666
1945-46	$3	$ 50,000		$ 50,000	16,666
1947-48	$3	$ 50,000	$ 989	$ 50,989	16,989
1949-50 (3)	$6	$100,000	$198,000	$298,000	49,666
1951-52 (4)	$3	$100,000	$ 18,000	$118,000	39,333
1953-54	$3	$ 60,000	$ 12,500	$ 72,500	24,166
1955-56	$3	$ 60,000	$ 12,500	$ 72,500	24,166
1957-58	$3	$ 74,115	$ 45,000	$118,115	39,705
Fiscal Year					
1959-60	$3	$ 43,923		$ 43,923	14,641
1960-61	$3	$ 40,188		$ 40,188	13,396
1961-62	$3	$ 46,911		$ 46,911	15,637
1962-63 (6)	$3	$ 71,364		$ 71,364	23,788
1963-64	$3	$115,413		$115,413	38,471
1964-65	$3	$155,025		$155,025	51,675
1965-66	$3	$211,386		$211,386	70,462
1966-67(7)	$3	$ 40,902		$ 40,902	13,634
1967-68	$3	$ 21,442		$ 21,442	7,147
1968-69	$3	$ 14,905		$ 14,905	4,968
1970-71	$3	$ 17,328		$ 17,328	5,776
1971-72	$3	$ 9,087		$ 9,087	3,029
TOTAL		**$1,739,902**	**$337,469**	**$2,077,371**	**620,647**

(1) SLA 1927, Chap. 48, established bounty on "every hair seal inhabiting the island waters and all waters adjacent to the southern coast of Alaska and east of the 152nd meridian."
(2) SLA 1935, Chap. 62 Area considered the same as above with the addition of the "waters of Bering Sea and of Golovin Bay lying within a line drawn from the tip of Rocky Point to the tip of Cape Darby."
(3) SLA 1949, Chap. 16, Bounty extended from Dixon Entrance to Demarcation Point.
(4) SLA 1951, Chap. 122. Bounty area reduced to that East of 152nd meridian, Bristol Bay and within 3 miles of mainland from Stebbins to Cape Krusenstern.
(5) Estimates based on appropriations except in cases where the regular appropriation was not entirely used the following appropriation, if smaller, was used as basis for estimate.
(6) SLA 1962, Chap. 35, Bounty extended to cover all seals inhabiting all inland and coastal waters of Alaska.
(7) SLA 1967, Chap. 35. Bounty area restricted "the inland and coastal waters of Alaska west of 159 degrees west longitude or north of 69 degrees north latitude, except the waters south of 58 degrees north latitude." (Bering and Chukchi seas and Arctic Ocean)

Source: Alaska Department of Fish and Game, Hair Seal Status Report, Dec. 1964
Alaska Department of Fish and Game, Division of Game. Game Harvests in Alaska, June 1968
Alaska Department of Fish and Game, Division of Game. The History of Predator Control in Alaska. Donald E. McKnight, February 1973.